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# EXPRO 74. A LISTING OF EXTRAMURAL PROJECTS TO BE FUNDED IN FISCAL YEAR 1974

Environmental Protection Agency
Washington, D.C.

November 1973

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# FOREWORD

The Office of Research and Development's **EX**tramural **PRO**gram Information Bulletin (**EXPRO**) is meant to inform you as to how to "do business" with the Office of Research and Development and to provide you with a listing of "Tasks" planned to be funded as research and demonstration projects by this Office during each Fiscal Year. This year, because of uncertain budget constraints, we were not able to have this publication available as soon in the Fiscal Year as desired. However, in future years, we expect to publish EXPRO soon after the Fiscal Year begins.

We greatly need the best available talent of the academic, scientific and industrial community to be applied to the difficult and complex research problems in the field of environmental quality. In the past, it has often been difficult to obtain comprehensive and up-to-date information regarding the research needs and interests of the Environmental Protection Agency. **EXPRO** should alleviate this difficulty by providing information to all interested parties regarding the subjects and goals of individual grant and contract tasks planned for the current Fiscal Year.

Stanley M. Greenfield
Assistant Administrator for
Research and Development

Hand-out copies of EXPRO '74 are available from the Research and Development Representative in each of EPA's 10 Regional Offices, from EPA's National Environmental Research Centers and Associated Laboratories throughout the country and from the Office of Research and Development, Headquarters, Washington, DC. Mail requests for additional copies should be addressed to:

Allowance Staff
Office of Research and Development
Environmental Protection Agency
Washington, DC 20460

If you do not presently receive EXPRO and wish your name added to the mailing list, fill out and return the sheet that can be found as the last page of Part I of this publication.

# EXPRO '74
# OFFICE OF RESEARCH and DEVELOPMENT
# EXTRAMURAL PROGRAM INFORMATION BULLETIN
# FISCAL YEAR 1974

The Environmental Protection Agency's Office of Research and Development (OR&D) conducts and supports research, development and demonstration efforts on a wide variety of subjects primarily related to pollution sources and effects, environmental sciences and pollution control technology. OR&D also is responsible for assuring the quality control and standardization of analytical techniques for the Environmental Protection Agency as well as promoting, through technology transfer, the use of new techniques, processes, methodologies, etc., in pollution control.

EPA was formed in late 1970 from programs in a number of executive agencies — e.g., the Department of Health, Education and Welfare (air pollution, solid waste, radiation, water hygiene and noise), the Department of the Interior (water pollution) and thea Department of Agriculture (pesticide regulation). Research and demonstration grants and contracts were supported by many of the precursor programs under guidelines of their respective Departments. With the melding of these programs into a single Agency, the extramural activities in support of research and development have likewise been integrated.

The purpose of EXPRO is two-fold: (1) to acquaint the research and development community with general guidelines for working with the Environmental Protection Agency's Office of Research and Development under grant or contract support, and (2) to make publically available a list of specific grant and contract Tasks which OR&D plans to fund during the current Fiscal Year. This listing is planned to be issued at the beginning of each new fiscal year. Addenda to EXPRO, containing the Task Number and page reference of those Tasks which a grantee or contractor has not yet been selected, will be issued periodically during the fiscal year. Any new Research Objective Achievement Plans and/or new Tasks and PAM/PED changes will be included in these addenda. We believe this will present the most timely and accurate picture of the Tasks for which EPA is seeking proposals at any given time. The addenda will automatically be mailed to anyone who is on our mailing list.

Although grants and contracts are authorized under various pieces of legislation*/, the general procedures for seeking support have been unified to those discussed below.

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*/See Appendix A for citations of legislative authority and the conditions, limitations, etc. related thereto.

# PART I

# GENERAL GUIDELINES FOR DEVELOPING GRANT OR CONTRACT PROJECTS

## OR&D Objectives and Organization

The Office of Research and Development establishes its objectives and priorities in response to the overall mission and priorities of EPA and is highly mission-oriented, concerned with solving specific priority problems rather than merely advancing scientific knowledge. Although the scopes of OR&D projects may vary from quite fundamental research to the full-scale engineering demonstration of new pollution control processes, all projects are directed at meeting specified objectives. Grant and contract proposals will, therefore, be evaluated in the context of pre-established plans.

The OR&D planning process places program definition responsibility in Headquarters and program execution responsibility in the National Environmental Research Centers (NERC's) at Cincinnati, Ohio, Corvallis, Oregon, Las Vegas, Nevada, and Research Triangle Park, North Carolina and at the Washington Environmental Research Center (WERC), Washington, D.C.**/. In both the program definition and program execution process, OR&D activities are grouped into a number of discrete subject categories or "Program Elements". Responsibility for managing all activities within a given set of Program Elements is held by a designated "Program Area Manager" or "PAM" at Headquarters; for each Program Element, his counterpart in one of the NERC's or WERC is designated the "Program Element Director" or "PED". The PAM is responsible for establishing the objectives and priorities within the Program Element, for allocating to the PED the resources necessary to implement the planned program and for monitoring over-all Program Element progress. The PED is responsible for project planning and for directing the efforts to achieve assigned objectives through use of his own research staff as well as through the development and award of contracts and grants. Narrative descriptions of all OR&D's Program Elements and the names and locations of corresponding PAM's and PED's are provided in Part II.

In addition to OR&D's Headquarters and laboratory personnel, each EPA Regional Office employs one or more staff members designated as Regional Research and Development Representatives. These individuals, see Appendix C, assist OR&D in identifying research needs of importance within each Region and promulgate the results of research and development projects among the "user community" both within and outside of EPA. These Regional R&D Representatives are also generally aware of the activities and objectives of the various programs of OR&D and can provide much useful information about its method of operation, organization, points of contact on various subjects, etc.

**/See Appendix B for organizational charts for Headquarters and the four National Environmental Research Centers and the Washington Environmental Research Center.

The subject categories or Program Elements into which OR&D's activities fall may be grouped into 12 major Program Areas.

These are:

Health Effects — epidemiological studies, toxicological research, teratological research, air/water/noise quality standards development, etc.

Ecological Processes and Effects — studies of terrestrial and aquatic ecosystems, both biotic and abiotic, as impacted by pollutants, meteorological research, pollutant interactions and fate in the environment, eutrophication, etc.

Municipal Pollution Control Technology — advanced waste treatment, water renovation, storm and combined sewer overflows, water supply technology, etc.

Industrial Pollution Control — treatment and control of industrial water pollution

Non-Point Pollution Control — mining and agricultural water pollution control, control of oil and hazardous material spills

Air Pollution Control — control technology for sulfurs, nitrogen oxides, particulates, etc.

Data and Information Research — research and development on scientific data and information system, etc.

Equipment & Techniques Research — methods and instrumentation for the detection, identification and quantification of pollutants, etc.

Quality Assurance — establishment and coordination of an Agency-wide standardization and quality control program for measurement of pollutants and environmental quality

Implementation Research — cost/benefit implications of alternative environmental protection strategies, environmental management innovations, etc.

| | | |
|---|---|---|
| Environmental Studies | — | delineation of anticipated long-term environmental impacts of various activities, environmental forecasting, etc. |

In addition to the above Program Areas, the Office of Research and Development sponsors a Minority Institutions Research Support Program (MIRS). The MIRS Program provides technical and financial support to minority colleges as well as fulfilling research and development requirements of the Agency. Detailed information on MIRS can be obtained from the Director, Minority Institutions Research Support Office, Office of Research and Development, Environmental Protection Agency, Washington, DC 20460.

## Office of Research and Development's Grant and Contract Activities***/

As the specific objectives within each Program Element are established, a series of "Tasks" are devised which will lead to attainment of the various planned objectives. Some of these Tasks will be carried out directly by EPA's staff while others are planned for accomplishment by grant or contract. Brief descriptions of each of these grant or contract Tasks are provided in PART II along with the approximate amounts of funds available for carrying out the grant Tasks and the contract Tasks listed within each Program Element. The expected "funding mechanism", i.e., grant or contract, and the "legislative authority" under which the work is planned to be done are also listed. Based upon the authorizing Legislation Code indicated for each Task, an applicant can determine from Appendix A what eligibility requirements, cost sharing, funding limitations, etc. will apply.

All planned contracting is carried out competitively with notices of the availability of Request for Proposal (RFP) documents publicly advertised. Unsolicited contract proposals should *not* be submitted for such projects. The review/selection procedures followed may vary slightly from project to project, but all pertinent information regarding both the project objectives and criteria for evaluation of proposals will be included in each RFP package. Neither PAM's nor PED's should be contacted for information on individual contract Tasks since such communication may conflict with Federal Procurement Regulations and could serve to disqualify a prospective contractor from further consideration.

With regard to all Tasks indicated to be funded by grants, contact with the cognizant PAM or PED is encouraged. In general, the PAM will be better able to respond to questions relative to over-all Program Element objectives, long-range planning, and program interactions within EPA while the PED will have more detailed information on individual Tasks and will, in fact, generally be the individual responsible for making the award/reject recommendation on individual proposals. Another source of information and assistance, particularly for general inquiries, is the OR&D Representative in each EPA Regional Office. These individuals can often give helpful guidance to those who find that their need for information relative to a specific subject is not satisfied by this document.

***/Note: Information on other EPA grant programs is presented in the booklet, "Grant Assistance Programs of the Environmental Protection Agency", available from EPA's Grants Administration Division, Washington, DC 20460. Information on contracting procedures and policies is presented in the booklet, "Contracting with EPA — A Guide for Prospective Contractors", available from EPA's Contracts Management Division, Washington, DC 20460.

## Guidelines For Submission Of Grant Applications Or Contract Proposals

A. Solicited contract proposals –

Requests for Proposals (RFP's) for all planned contract Tasks will be advertised in the *Commerce Business Daily*. These advertisements provide instructions for obtaining RFP packages from EPA's Contracts Management Division. Each RFP package includes detailed information on the form and content of proposals to be submitted as well as the required time and place of submission.

B. Unsolicited contract proposals –

While most of OR&D's contract research and demonstration is conducted through use of RFP's to solicit proposals (item A above), contracts can also be awarded on the basis of unsolicited proposals which meet the sole-source requirements of the Federal Procurement Regulations. Unsolicited contract proposals should be addressed to the Grants Administration Division, Environmental Protection Agency, Washington, DC 20460. While no specific format is required, such proposals should generally contain:

1. Project objective
2. Need, utility and significance of project
3. Scope of work, i.e., project plan
4. Experimental data previously developed or feasibility studies completed
5. Estimated duration of project
6. Scientific or technical references
7. Technical capabilities (personnel, facilities, special resources)
8. Project costs

The material submitted should contain both a *technical* and a *business* proposal. The *technical* proposal should clearly define the unique concept involved and include a plan for turning the concept into reality. It is suggested that the technical proposal identify any proprietary aspects of the proposed ideas or process. The *business* proposal should include a detailed cost proposal, information concerning past Government contracts, and any special terms and conditions desired.

C. Research or demonstration grant applications –

**Pre-application activity —**

Although grant applications may be submitted at any time and on any subject, often it will be helpful to those seeking support to contact EPA first to get more specific details about current R&D objectives and about Tasks recently started or which may have been deferred. Such discussions can often save time and effort, both for the applicant and for EPA, by highlighting subject areas most likely to receive favorable consideration.

Two other actions which can be taken prior to submission of a formal grant application will also be helpful:

1. Review OR&D's current list of grant Tasks to be funded in the specific area of interest (PART II of this document) to determine whether these objectives match the applicant's research interests and capabilities: and

2. Submit a "preproposal" of the proposed research concept to the cognizant PED for informal review.

   A preproposal should normally consist of a three or four-page narrative outlining the project concept and containing the following information:

   (a) **Objective** – a clear statement of the specific objective is necessary. If the objective is designed to fulfill a specific Task or Tasks (as identified in Step 1 above), the Task(s) should be identified. If the objective cannot be associated with any specific Task, some statement of the presumed value to EPA of attaining the research objective should be made.

(b) **Project Plan** – a brief description of the research/development/demonstration concept and the plan for execution of the proposed project, including a projected time-schedule for accomplishment of intermediate project milestones and the final objective.

(c) **Budget** – a preliminary estimate of total project costs along with an indication of the share of the project costs which will be provided by the applicant.

(d) **Staff and Facilities** – a brief listing of key project staff and capabilities and a brief description of any special facilities or other factors which would contribute to the success of the project. A single person who will have responsibility for planning, coordination, and supervising the project should be identified along with the fraction of his time to be devoted to the project.

Following review and evaluation of the preproposal, the prospective applicant will be advised whether (a) an application should be submitted for formal review, (b) submission of a modified preproposal is suggested, or (c) further pursuit of the particular topic is discouraged.

**Formal applications —**

All formal grant applications are to be submitted to the Grants Administration Division, Environmental Protection Agency, Washington, DC 20460. After formal "logging in" and acknowledgement, submissions are referred to the Office of Research and Development for program relevance review by the cognizant Program Element Director. This review quickly screens out those applications for which EPA has no authority or interest or those for which no funds are available. For relevant proposals, scientific/technical merit reviews are then conducted by *both* in-house experts and extramural reviewers. Extramural reviews are obtained in the National Science Foundation fashion — individual written reviews submitted by mail. Comments are also obtained from the Regional Office in the Region where the project would be conducted to determine the relationship of a proposed project to Regional programs and policies.

The individual coordinating the scientific/technical merit review (normally the cognizant PED) assembles and evaluates both intramural and extramural review comments and prepares a recommendation for action on each application. The recommendation may be to award a grant, to reject the application, or to attempt to negotiate with the applicant to modify the scope of work. In those cases where the proposed scope of work could be modified in order to relate more directly to EPA's objectives and thereby qualify for funding, direct contact is made with the applicant to determine whether or not acceptable adjustments in the scope of work can be made.

Complete this page and return it to the address listed below if you wish your name added to the mialing list for "EXPRO". If you are already receiving EXPRO, it will not be necessary for you to return this page:

Name of Organization

Sub-Division or Department

Street Address

City State Zip

Individual Contact

Complete the above information and mail to:

Allowance Staff
Office of Research and Development
Environmental Protection Agency
Washington, DC 20460

# PART II

## LISTING OF GRANT AND CONTRACT TASKS PLANNED FOR FUNDING DURING FISCAL 1974

### HEALTH EFFECTS PROGRAM AREA

Health effects research is directed toward assessment of health hazards associated with environmental pollution from a number of media and categories including air, water, pesticides, radiation and noise. Various disciplines are brought together for this purpose. Major program emphasis is devoted to the Community Health and Environmental Surveillance Studies (CHESS) Program. CHESS consists of a series of epidemiologic studies in various communities throughout the United States whose objectives are to evaluate the effects of exposure to common pollutants upon sensitive health indicators.

Complementing CHESS is the Biomedical Research Program which is directed at assessing, at the community level, pollution upon human physiology. Evaluations of health effects resulting from community level environmental pollution and classical and innovative toxicologic research studies are conducted. Scientific information on the health effects associated with exposures to fuels, fuel additives and their combustion products is collected. Pesticides, radiation and specific toxic substances are evaluated in studies conducted within this program area.

The cumulative output from all of these programs will provide needed health intelligence required to formulate environmental policies protective of public health.

Program Area Manager (PAM):

Mr. J. Wesley Clayton
Health Effects Division
Office of Research and Development
Environmental Protection Agency
Waterside Mall
Washington, DC 20460
Telephone: (202) 755-0626

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## HEALTH EFFECTS PROGRAM AREA

### PROGRAM ELEMENT NO. 1AA001 – POLLUTANT CHARACTERIZATION

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: **NONE**
Contracts: $495,000

Program Element Output: Documentation of the effects of air pollution constituents and recommendation of standards for these pollutants for both ambient air quality and emissions limitations. Program efforts will be to: (1) revise criteria documents and recommend revised ambient air quality standards for fine particulates, sulfur dioxide, nitrogen dioxide, carbon monoxide, photochemical oxidants, hydrocarbons and others; and (2) recommend control approaches for various pollutants including, among others, manganese, nickel, chromium, vanadium and polycyclic organic materials. In addition, this program will support the setting of National performance or emission standards for a variety of specified sources, such as aircraft, motor vehicles, industrial categories and sources of hazardous pollutants.

Program Element Director (PED):

Dr. F. Gordon Hueter
Special Studies Staff
National Environmental Research Center
Environmental Protection Agency
Research Triangle Park, NC 27711
Telephone: (919) 549-8411

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| PEMP-002 | Initiate review of priorities | Contract | 103 | Clayton |

**PROGRAM ELEMENT NO. 1AA001**

**Research Objective Achievement Plan 26AAA: Air Quality Criteria**

Objective: Revised air quality criteria documents for $SO_x$, Particulate, $NO_x$, hydrocarbon, and Photochemical Oxidants. Air pollutant assessment documents for Cd, Mn, Cr, Ni, V, Pt, Zn, Cu, SE, As, $Cl_2$-$HC_1$, Co, Fe, Ru, Pd, pesticides, and others as they are recognized. OR&D position papers, relative to and in sequence with the above pollutants, indicating the need for control, identifying needed additional research, and recommending control strategy. Assistance to NATO/CCMS and WHO re drafting of air quality guideline documents. Revised documentation for hazardous pollutants, and sulfates and sulfuric acid.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 26AAA-065 | Prepare documentation on arsenic necessary for (1) determination of need for control, (2) applicable section of law, if control needed, (3) supporting documentation to accompany rule making, and (4) identify research needs. | Contract | 103 | Hueter |
| 26AAA-066 | Prepare handbook on toxicity of metals with emphasis on the interrelations between metals. | Contract | 103 | Hueter |
| 26AAA-082 | New pollutant assessment. | Contract | 103 | Hueter |

## HEALTH EFFECTS PROGRAM AREA

### PROGRAM ELEMENT NO. 1AA005 - COMMUNITY HEALTH EFFECTS SURVEILLANCE STUDIES (CHESS)

Funds: Available as of November 3, 1973 for support of listed Tasks:

| | |
|---|---|
| Grants: | **NONE** |
| Contracts: | $295,000 |

Program Element Output: Quantification of the health effects of human exposure to air pollutants, and documentation of the health benefits of environmental control. Program effort includes (1) developing additional, more sensitive health indicators; (2) surveying human populations to detect health effects resulting from pollutant exposure and; (3) expanding the number of pollutants to be studied, including sulfur oxides, nitrogen oxides, particulates, photochemical oxidants, trace metals, and synthetic organic toxic substances such as pesticides.

Program Element Director (PED):

Dr. Carl M. Shy
Human Studies Laboratory
National Environmental Research Center
Environmental Protection Agency
Research Triangle Park, NC 27711
Telephone: (919) 549-8411

**PROGRAM ELEMENT NO. 1AA005**

**Research Objective Achievement Plan 21AYB:** **CHESS – Effects Upon Health Resulting from Community Exposures to Gaseous and Particulate Air Pollutants**

Objective: Produce monographs describing human health effects of long-term and short-term exposure of population subgroups to sulfur oxides, respirable particulates, nitrogen oxides, carbon monoxide and photochemical oxidants. Health effects will be identified in CHESS neighborhoods and in selected high risk subgroups. Human exposure chambers will be used to provide dose-response information on the clinical and physiologic effects of controlled human exposure to CO, $NO_2$, and photochemical oxidants.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AYB-038 | Effects of etiologically defined respiratory infections on lung functions and its growth in an area of low air pollution. | Contract | 103 | Shy |
| 21AYB-051 | Maintenance and operation of CLEANS facilities. | Contract | 103 | Shy |
| 21AYB-058 | Tissue will be collected in selected CHESS Communities for pollutant burden studies. | Contract | 103 | Shy |

## HEALTH EFFECTS PROGRAM AREA

### PROGRAM ELEMENT NO. 1AA007 - BIOMEDICAL RESEARCH

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: NONE
Contracts: $102,000

Program Element Output: Generation of health effects information required for development and revision of criteria and standards pertaining to air pollutants. Program effort includes: (1) studies of pollutants acting singly or in combination with other pollutants or environmental factors; (2) assessment of pollutant effects upon accidental exposure victims, human volunteers, laboratory animals, isolated perfused organ systems and tissue cultures; (3) demonstration of possible adverse effects caused by carbon monoxide, odors, certain trace substances and acid mists; and (4) development of laboratory models to predict the impact of environmental pollution upon biologic systems.

Program Element Director (PED):

Dr. Carl M. Shy
Human Studies Laboratory
National Environmental Research Center
Environmental Protection Agency
Research Triangle Park, NC 27711
Telephone: (919) 549-8411

Dr. Jerry F. Stara
Environmental Toxicology Research Lab
National Environmental Research Center
Environmental Protection Agency
1055 Laidlaw Avenue
Cincinnati, OH 45268
Telephone: (513) 684-7411

Dr. R. John Garner
Experimental Biology Laboratory
National Environmental Research Center
Environmental Protection Agency
Research Triangle Park, NC 27711
Telephone: (919) 549-8411

**PROGRAM ELEMENT NO. 1AA007**

**Research Objective Achievement Plan 21AFK:** **Toxicologic Assessment of Pollutants from Mobile and Stationary Sources: Multi-Media Exposure**

Objective: Output from this ROAP will provide the necessary background health intelligence specifically toxicologic effects data required as a guide in making regulatory decisions concerning pollution of the environment from mobile and stationary sources and in various environmental media. This research will provide information which is largely unavailable at the present time. The resulting research reports include: A. Data on overt effects of auto exhaust emission products resulting from the usage of control devices such as catalysts: as single compounds (PT, Pd, Al, Cr, Ni) and as total emission products (70%). B. Toxicological assessment of the impact of environmental contamination by trace metals such as Cd, Mn, Pb. (15%). C. Data on toxic effects of Methylcyclopentadienl Manganese Tricarbonyl (MMT or CI-2), a fuel additive which is planned to be used as an antiknock agent in gasoline in addition to present usage as a smoke suppressant (5%). D. Completion of the "Chronic study of effects of auto exhaust, simulated smog and other air pollutants" in beagles on a cooperatiave basis with the University of California (5%). E. Cooperative studies with the Water Supply Health Effects program concerned with physiological availability of trace metals from water supply, with particular emphasis on Cd, Pb and Ba (5%).

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AFK-022 | Contract to evaluate toxicity of catalysts to be used in automotive-emission control devices. | Contract | 103 | Stara |
| 21AFK-025 | Biochemical and physiological studies support contract. | Contract | 103 | Stara |
| 21AFK-026 | Pathologic and tissue chemistry support contract. | Contract | 103 | Stara |
| 21AFK-027 | Purchase and preparation of experimental compounds for biologic assessment of catalyst attrition products. | Contract | 103 | Stara |

## HEALTH EFFECTS PROGRAM AREA

### PROGRAM ELEMENT NO. 1BA019 - WATER QUALITY HEALTH EFFECTS RESEARCH

Funds: No extramural Tasks remaining which are to be funded in this Fiscal Year.

Program Element Output: Development of valid criteria for setting water quality standards for municipal (drinking) and recreational (freshwater and marine) uses. Research effort includes studies of biological effects resulting from the presence of potentially toxic contaminants in the water environment. The goal of the program is to assure public health and pleasing aesthetics.

Program Element Director (PED):

Mr. Gordon G. Robeck
Water Supply Research Laboratory
National Environmental Research Center
Environmental Protection Agency
Cincinnati, OH 45268
Telephone: (513) 684-8311

# HEALTH EFFECTS PROGRAM AREA

## PROGRAM ELEMENT NO. 1CA046 – WATER SUPPLY HEALTH EFFECTS RESEARCH

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $ 28,000
Contracts: $278,000

Program Element Output: Development of valid criteria for promulgating water quality standards for municipal (drinking) and recreational (freshwater and marine) uses. Research effort includes studies of biological effects resulting from the presence of infectious agents and potentially toxic contaminants in the water environment. The goal of the program is to assure public health and pleasing aesthetics.

Program Element Director (PED):

Mr. Gordon G. Robeck
Water Supply Research Laboratory
National Environmental Research Center
Environmental Protection Agency
Cincinnati, OH 45268
Telephone: (513) 684–8311

## PROGRAM ELEMENT NO. 1CA046

**Research Objective Achievement Plan 21APV: Occurrence and Effects of Organic Contaminants in Drinking Water**

Objective: 1. Concentrate, extract, and partition organics in drinking water 2. Determine acute and chronic toxicity of organic fractions. 3. Identify toxic compounds and determine the chronic toxicity of these agents. 4. Conduct comparative epidemiological studies of populations exposed to organics that are highly toxic to experimental animals. 5. Correlate toxicity of organics with some general parameter of organic loading. 6. Set interim standard for organics in drinking water

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21APV-011 | Determine the toxic effects to rodents of subchronic infestion with halo ether. | Contract | 104 | Robeck |

**Research Objective Achievement Plan 21APW: Occurrence and Effects of Inorganic Contaminants of Drinking Water**

Objective: A better scientific base will be provided to enable the setting of limits for inorganic contaminants not presently contained in the Drinking Water Standards and revision of current limits not based on sound health effects data. Knowledge of drinking water's contribution to the total body burden will assist in setting limits for other sources of exposure.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21APW-025 | Study the physiological availability of metals from water. | Contract | 104 | Robeck |

**Research Objective Achievement Plan 21APZ: Recreational Water Quality Criteria**

Objective: A research report providing interim health effects criteria for primary contact, marine, and fresh recreational waters by February 1976. Organisms to be considered in developing stream standards for recreational waters will be indicated as well as environmental conditions that effect the disease potential of recreational waters. Recommended final criteria for standards for primary contact and other recreational water use by June 1979 depending on successful outcome of all tasks.

**PROGRAM ELEMENT NO. 1CA046**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21APZ-002 | Establish protocols for laboratory diagnosis. Examine clinical specimens from selected individuals who report health effects from recreational waters use and see a physician during epidemiological studies. | Contract | 104 | Robeck |
| 21APZ-004 | Adapt aerial photographic and/or other appropriate technology for determining the percentage of beach population actually at-risk ("swimmers") and identifying the individuals involved. | Contract | 104 | Robeck |
| 21APZ-022 | Conduct Epidemiologic-Microbiologic study to compare health effects among swimmers at a barely acceptable and a relatively unpolluted salt water beach in New York City. | Contract | 104 | Robeck |
| 21APZ-024 | Pretest epidemiologic methods at site selected for fresh water trials. | Contract | 104 | Robeck |
| 21APZ-031 | Examine feasibility and develop methods for serological epidemiology. | Research Grant | 104 | Robeck |
| 21APZ-032 | Develop MF method for enumeration of human *Candida* strains as indicators of pollution with feces or other human discharges. | Research Grant | 104 | Robeck |
| 21APZ-033 | Evaluate relationship of polyamine production to ecological adaptation of coliforms to residence in G.I. tract. | Research Grant | 104 | Robeck |

## PROGRAM ELEMENT NO. 1CA046

**Research Objective Achievement Plan 51ASB:** **Health Effects Associated with Consumption of Renovated Water**

Objective: The results of the investigations should identify potential adverse health effects from consumption of renovated waste water. Health criteria will be developed for Drinking Water Standards when the source water is sewage and industrial waste water. The challenge to water reuse treatment plant will be variable and consequently the product water may meet standards on the average, but at times, exceed limits. The extent of allowable variation will be determined.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 51ASB-002 | Modify techniques for collection of organic chemical residues from product water streams. | Contract | 104 | Robeck |
| 51ASB-007 | Survey of metal occurrence in renovated water. | Contract | 104 | Robeck |

# HEALTH EFFECTS PROGRAM AREA

## PROGRAM ELEMENT NO. 1CB047 – WATER SUPPLY CONTROL TECHNOLOGY

Funds: Available as of November 3, 1973 for support of listed Tasks:

| | |
|---|---|
| Grants: | NONE |
| Contracts: | $450,000 |

Program Element Output: New or improved technology for the effective and economical control of drinking water contaminants during storage, treatment, and distribution. Program efforts will be directed to demonstrate technologies for removal of infectious agents, potentially toxic or aesthetically displeasing contaminants so that municipal sectors will be able to achieve compliance with present and future water quality standards. Improved methods of operating both new and existing water supply facilities will be developed and demonstrated.

Program Element Director (PED):

Mr. Gordon G. Robeck
Water Supply Research Laboratory
National Environmental Research Center
Environmental Protection Agency
Cincinnati, OH 45268
Telephone: (513) 684–8311

## PROGRAM ELEMENT NO. 1CB047

**Research Objective Achievement Plan 21AQE:** **Control of Microbiological Quality of Drinking Water**

Objective: Information gathering to generate a series of technical papers and operational guidelines for necessary changes in design criteria and treatment procedures that are the outgrowth of various phases of this study, and to support the development of drinking water standards.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AQE-014 | Modification of existing techniques for electron microscopy studies of virus. | Contract | 301 | Robeck |
| 21AQE-015 | Development of mathematical and statistical model for viral inactivation. | Contract | 301 | Robeck |

## HEALTH EFFECTS PROGRAM AREA

### PROGRAM ELEMENT NO. 1DA313 – ENVIRONMENTAL EFFECTS RESEARCH

Funds: No extramural Tasks remaining which are planned for funding during this Fiscal Year.

Program Element Output: Identification of the major effects of storing, collecting, transporting, processing and disposing of solid wastes on man, animals, aquatic life, plants, materials and the environment.

Program Element Director (PED):

Mr. Robert Stenburg
Solid and Hazardous Waste Research Lab
National Environmental Research Center
Environmental Protection Agency
Cincinnati, OH 45268
Telephone: (513) 684–4477

## HEALTH EFFECTS PROGRAM AREA

### PROGRAM ELEMENT NO. 1EA078 – PESTICIDES HEALTH EFFECTS RESEARCH

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $256,600
Contracts: See RFP when issued.

Program Element Output: An evaluation of the acute and chronic health hazards from human exposure to pesticides, their residues and their metabolites. This program is concerned with identification of pesticide metabolites; and evaluation of pesticides effects upon normal biological functions. Indices of effects include mortality, growth rate, clinical signs of poisoning, hematologic factors and reproduction. The scope of these investigations ranges from laboratory studies of animals and exposed humans to community epidemiologic projects.

Program Element Director (PED):

Dr. William F. Durham
Pesticides & Toxic Substances Effects Lab
National Environmental Research Center
Environmental Protection Agency
Research Triangle Park, NC 27711
Telephone: (919) 549–8411

**PROGRAM ELEMENT NO. 1EA078**

**Research Objective Achievement Plan 21AYL: Pesticide Toxicity Studies**

Objective: Reports will be issued correlating exposure of animals to single pesticides, combinations of pesticides, and pesticides in combination with other environmental contaminants or stressors to increased incidence of biological malfunction. These data will provide necessary support to the regulatory and control functions of the Agency concerning the risk to occupationally exposed and general population groups. Laboratory data interfaced with human studies will provide sensitive indices of toxic effects with improved on-going early warning of hazard to human health.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AYL-020 | Actions of pesticides and other drugs on male reproductive organs. | Research Grant | 20 | Durham |
| 21AYL-021 | Roles of mixed function oxidases in insecticide action. | Research Grant | 20 | Durham |
| 21AYL-022 | Pesticide epidemiological field studies. | Research Grant | 20 | Durham |
| 21AYL-023 | Mechanism of pesticide degradation. | Research Grant | 20 | Durham |
| 21AYL-026 | Metabolic interactions of hormonal steroids and chlorinated hydrocarbons. | Research Grant | 20 | Durham |
| 21AYL-027 | N.M.R. Studies on the molecular interactions of pesticides of environmental concern. | Research Grant | 20 | Durham |
| 21AYL-028 | Metabolism of carbamate pesticides. | Research Grant | 20 | Durham |
| 21AYL-029 | Biological hazards of phototransformed pesticides. | Research Grant | 20 | Durham |
| 21AYL-030 | Development of tissue banking techniques to evaluate persistent environmental pesticides. | Contract | 20 | Durham |

## HEALTH EFFECTS PROGRAM AREA

### PROGRAM ELEMENT NO. 1FA081 – RADIATION EPIDEMIOLOGICAL RESEARCH

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $55,200
Contracts: $96,000

Program Element Output: Qualification by epidemiologic studies of man's risk of developing various diseases due to exposure to radiation. Program efforts will be directed specifically to evaluate: (1) the development of neoplasms of all organ sites of Japanese atomic bomb survivors; (2) the development of thyroid neoplasms in young adults who, as children, received diagnostic doses of $^{131}I$; and (3) the development of lung malignancies in patients who have body burdens of thorium dioxide and are continuously exhaling thoron.

Program Element Director (PED):

Dr. Carl M. Shy
Human Studies Laboratory
National Environmental Research Center
Environnmental Protection Agency
Research Triangle Park, NC 27711
Telephone: (919) 549–8411

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| PEMP-001 | Assessment of radiation levels and hazards (NCRP). | Research Grant | 301 | Clayton |

**PROGRAM ELEMENT NO. 1FA081**

**Research Objective Achievement Plan 21ALX: Human Studies of Radiation Effects by Epidemiologic Methods**

Objective: Technical reports describing: (1) Health experience of atomic bomb survivors and their proginy, (2) Dose-response curve of thyroid neoplasm following exposure to diganostic levels of radioiodine, (3) Relationship of congenital anomalies to parental exposure to radar, (4) Mathematic model for analysis of mortality accounting for completing risks. These data will be used as the basis of criteria for setting radiation exposure standards.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ALX-003 | Purchase data to develop dose-response curve of thyroid tumors in children exposed to diagnostic levels of radioiodine. | Contract | 301 | Shy |
| 21ALX-005 | Determine if congenital anomalies are result of paternal exposure to radar preconception, observed increase at military radar base will be confirmed or denied. | Contract | 301 | Shy |
| 21ALX-006 | Develop and test mathematical model for analysis of effects of competing risks on relative risk of latent effect of exposure. | Research Grant | 301 | Shy |

## HEALTH EFFECTS PROGRAM AREA

### PROGRAM ELEMENT NO. 1FA082 - RADIATION HEALTH EFFECTS RESEARCH

Funds: No extramural Tasks remaining which are planned for funding during this Fiscal Year.

Program Element Output: Definition of the health effects in man resulting from exposure to ionizing and electromagnetic radiation in order to provide the scientific base for development of general population guidelines and standards. The program includes experimental laboratory investigations on effects of specific radionuclides, and evaluation of and interactions between ionizing radiation and other biological, chemical and physical environmental pollutants.

Program Element Director ((PED):

Dr. R. John Garner
Experimental Biology Laboratory
National Environmental Research Center
Environmental Protection Agency
Research Triangle Park, NC 27711
Telephone: (919) 549-8411

Mr. George Morgan
Monitoring Systems Research & Development Lab
Environmental Protection Agency
P. O. Box 15027
Las Vegas, NV 89114
Telephone: (702) 736-2969

# HEALTH EFFECTS PROGRAM AREA

## PROGRAM ELEMENT NO. 1GA085 – NOISE HEALTH EFFECTS RESEARCH

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: **NONE**
Contracts: See **RFP** when issued.

Program Element Output: The objective is to quantify the health effects of exposure to environmental nosie, and to privide health effects information required for the establishment and revision of criteria and standards related to noise exposures. Research effort includes: environmental noise measurements and exposure determinations; physiological and psychological responses and effects (auditory and non-auditory) on humans and animals to environmental noise; and coordination of noise health effects research between EPA and other Federal governmental agencies.

Program Element Director (PED):

Dr. George Simon
Health Effects Division
Office of Research and Development
Environmental Protection Agency
Waterside Mall
Washington, DC 20460
Telephone: (202) 426-9456

## PROGRAM ELEMENT NO. 1GA085

**Research Objective Achievement Plan 21AYK: Health Impact on Environmental Noise**

Objective: Research reports will provide data for revising criteria and standards. measurements and exposure determinations will be made in selected communities and environments; a data bank of environmental noise levels will be established, human responses assessed and a noise descriptor derived. Federal noise research activities will be identified to serve as base for coordinated effort.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AYK-004 | Coordination of federal noise research programs. | Contract | 14 | Simon |

## HEALTH EFFECTS PROGRAM AREA

### PROGRAM ELEMENT NO. 1HA092 – NATIONAL CENTER FOR TOXICOLOGICAL RESEARCH

Funds: No extramural Tasks remaining which are planned for funding during this Fiscal Year.

Program Element Output: Evaluation of the impact of low level chronic exposures of man to environmental pollutants, with particular emphasis upon possible carcinogenic, mutagenic and/or teratogenic effects. Initial effort will involve laboratory animals but with emphasis upon the ability to extrapolate these data to man.

Program Element Director (PED):

Mr. J. Wesley Clayton
Health Effects Division
Office of Research and Development
Environmental Protection Agency
Waterside Mall
Washington, DC 20460
Telephone: (202) 755-0626

## HEALTH EFFECTS PROGRAM AREA

### PROGRAM ELEMENT NO. 1HA099 – TOXIC SUBSTANCES HEALTH EFFECTS RESEARCH

Funds: No extramural Tasks remaining which are planned for funding during this Fiscal Year.

Program Element Output: Development of specific information to be used as a basis for necessary regulatory action on the potential health effects of new and existing chemical toxicants. The total assessment of health effects due to the multi-media exposure of the public to toxic chemicals requires the development of an extensive information system. A system containing production and distribution information for each chemical and the capability for sorting data on effects and pollutant burdens will be developed under this program element. This information system will be used to identify problems of national scope and will aid in determining health research priorities for these problems.

Program Element Director (PED):

Dr. William F. Durham
Pesticides & Toxic Substances Effects Lab
National Environmental Research Center
Environmental Protection Agency
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# HEALTH EFFECTS PROGRAM AREA

## PROGRAM ELEMENT NO. XF1106 - AEC RADIATION EFFECTS PROGRAM

Funds: No extramural Tasks remaining which are planned for funding during this Fiscal Year.

Program Element Output: Determination, by means of laboratory and field investigations of the potential hazard to humans and the environment resulting from nuclear testing activities. The establishment of testing criteria and radiation protection standards requires an understanding of the behavior of selected radionuclides in man's food chain and the environment. In this study emphasis will be placed on radionuclide metabolism in plants and animals, soil to plant relationship, and the transport, distribution and exchange within and between these components.

Program Element Director (PED):

Mr. George Morgan
Monitoring Systems Research & Development Lab
Environmental Protection Agency
P. O. Box 15027
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Telephone: (702) 736-2969

## ECOLOGICAL PROCESSES AND EFFECTS PROGRAM AREA

The ecological processes and effects research area is responsible for determining the effects of air and water pollutants on the structure and function of ecosystems and on biotic and abiotic subcomponents of these ecosystems. One major objective of the program is to develop scientific information necessary for water quality criteria and secondary air quality criteria.

Programs on aquatic systems are conducted to determine the effects of pollutants such as temperature, pesticides and heavy metals on fresh and marine water fish, invertebrates and their food chain organisms. Acute and chronic effects of pollutants on life stages of the organisms are determined.

Investigations of the effects of major air pollutants on crops and vegetation are conducted to provide information for establishing secondary ambient air quality standards. Specific studies of the effects of $NO_x$, $SO_x$, hydrocarbons, and oxidants are conducted on representative terrestrial ecosystems.

Also included are studies of alternative methods of pest control. These efforts are aimed at the reduction of dependence upon persistent chemical pesticides. Non-chemical methods of pest control with great specificity on target organisms and little or no effects on non-target organisms are sought.

A second major objective of this program area is to determine a chemical, physical and biological process associated with sources, pathways, persistences, and fates of pollutants in ecosystems. The results of these studies along with results from effects and other research areas provide the scientific and technical basis for control and abatement actions.

Program Area Manager (PAM):

Dr. Frank Wilkes
Ecological Processes and Effects Division
Office of Research and Development
Environmental Protection Agency
Xerox Building
Washington, DC 20460
Telephone: (703) 522-1826

# ECOLOGICAL PROCESSES AND EFFECTS PROGRAM AREA

## PROGRAM ELEMENT NO. 1AA002 – FUEL AND FUEL ADDITIVE REGISTRATIONS

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $180,000
Contracts: See RFP when issued.

Program Element Output: Registration of all fuels and fuel additives. Program efforts will be to: (1) provide standardized test procedures needed for emission characterization; (2) provide an independently derived information base on the types and amounts of metals; non-metal, and organics present in fuels and fuel additives; (3) assess the effects of fuel and related exhaust emissions on human health and public welfare, emission control devices, and visibility; (4) determine fuel emission contributions to total atmospheric pollutant loading; and (5) recommend, as warranted, candidates for regulation.

Program Element Director (PED):

Mr. John Moran
Source Emmissions Measurements Branch
National Environmental Research Center
Environmental Protection Agency
Research Triangle Park, NC 27711
Telephone: (919) 549-8411

## PROGRAM ELEMENT NO. 1AA002

**Research Objective Achievement Plan 26AAE:** **Development of Information for Fuel and Fuel Additives Control or Prohibition**

Objective: Registration of designated fuels and fuel additives. Protocols to assess the effect of fuel components and additives on emission products, control device performance, atmoshperic loading and transformations, health effects, and ecological effects. Resulting information will allow the control or prohibition of fuel components and/or additives pursuant to Sec. 211 of the 1970 Amendments in a time frame to assure public safety and satisfactory performance of advanced automotive control systems.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 26AAE-013 | Characterize rotary engine emissions as a function of lubricant composition and fuel/lubricant interaction. Develop test protocol for non-regulated emissions therefrom. | Research Grant | 103 | Moran |
| 26AAE-039 | Effects of chronic or intermitent exposure to low levels of major catalyst attrition products or their decay products on human pollutant burdens. | Research Grant | 103 | Moran |
| 26AAE-040 | Assessment of subtle physiologic changes induced by exposure to major catalyst attrition products or their decay products, enzyme changes, immunologic deficits, chromosomal abbreations, etc. | Contract | 103 | Moran |

# ECOLOGICAL PROCESSES AND EFFECTS PROGRAM AREA

## PROGRAM ELEMENT NO. 1AA003 – REGIONAL AIR POLLUTION STUDY

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $ 410,000
Contracts: $2,960,000

Program Element Output: Analysis of the transport and dispersion processes over a large geographical region associated with stable and reactive air pollutants emanating from a multitude and variety of sources. Program efforts will be to: (1) obtain an improved understanding of the atmospheric reactions associated with $SO_2$, $NO_x$, hydrocarbons, ozone, organic nitrates, and aldehydes; (2) define an optimum meteorological measurements network for a Region; (3) evaluate the representativeness of meteorological measurements required for diffusion modeling and control strategies; and (4) test independently developed air quality and environmental models.

Program Element Director (PED):

Mr. Phil Allen
Meteorology Laboratory
National Environmental Research Center
Environmental Protection Agency
Research Triangle Park, NC 27711
Telephone: (919) 549-8411

**PROGRAM ELEMENT NO. 1AA003**

**Research Objective Achievement Plan 26AAI:** **Evaluation and Demonstration of the Effectiveness of Air Pollution Control Strategies on a Regional Scale**

Objective: Predictive models and analyses of dispersion and other atmoshperic processes affecting atmoshperic pollutants, to describe pollutant concentration distributions on time scales ranging from an hour upward, and on space scales from street size upward to 100 km; optimum emission inventory procedures and aerometric networks, a data bank suitable for future model evaluation. Output will contain cost/benefit factors so it may be used to assess cotrol strategies and regional pollution impact.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 26AAI-012 | St. Louis prime contractor service and RAMS network procurement contract. | Contract | 103 | Allen |
| 26AAI-015 | Near-surface climatology description. | Research Grant | 103 | Allen |
| 26AAI-017 | Develop METRAC system and test. | Contract | 103 | Allen |

**Research Objective Achievement Plan 56AAI:** **Regional Air Pollution Study Measurements and Instrumentation**

Objective: Measurement techniques will be used for evaluation of photochemicals diffusion models in RAPS.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 56AAI-011 | Test and calibration of laser-induced fluorescence method for the direct measurement of $NO_2$. | Contract | 103 | Allen |
| 56AAI-017 | Evaluate collection and measurement techniques for freons as meterological tracers of air mass. | Contract | 105 | Allen |
| 56AAI-024 | Fabricate and evaluate instrument for measuring acetylene at 0.1 ppb level. | Contract | 103 | Allen |

**PROGRAM ELEMENT NO. 1AA003**
**Research Objective Achievement Plan 56AAI**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 56AAI-027 | Develop charged-particle (proton or alpha particle) elastic scattering techniques to measure elements with atomic numbers less than 17 in samples of airborne particles. | Research Grant | 103 | Allen |

**Research Objective Achievement Plan 56AAJ:** **Regional Air Pollution Study Air Quality Characterization**

Objective: Identification of sources of visibility loss in St. Louis; fine particle spatial distribution;specifications of particle sizes, size spectra, and chemical composition; identification of gas-particle interactions for development of models of visibility reduction; data on choice of tracer substances for study of the regional atmosphere;; chemical inputs to the photochemical modeling effort;; experimental data on site selection for the monitoring network.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 56AAJ-010 | Aerosol size distribution. | Research Grant | 103 | Allen |
| 56AAJ-013 | Aerosol chemical composition. | Research Grant | 103 | Allen |
| 56AAJ-014 | Visibility degradation model. | Research Grant | 103 | Allen |
| 56AAJ-015 | Kinetic model verification. | Research Grant | 103 | Allen |
| 56AAJ-021 | Site selection and verification. | Contract | 103 | Allen |
| 56AAJ-024 | Aerosol size distribution. | Research Grant | 103 | Allen |
| 56AAJ-026 | Visibility degradation model | Research Grant | 103 | Allen |
| 56AAJ-027 | Kinetic Model Verification. | Research Grant | 103 | Allen |

## PROGRAM ELEMENT NO. 1AA003

**Research Objective Achievement Plan 56AAK: Ecological Studies**

Objective: Biological Effects Measuring System (BEMS) in conjunction with Regional Air Measuring System in and surrounding St. Louis will provide an unprecendented opportunity to correlate ambient air quality measurements with significant biological interfaces. Implementation of BEMS will thus provide support for assessing economic impact deriving control strategies and setting Secondary Air Quality Standards.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 56AAK-002 | Implement and operate Biological Effects Monitoring System. | Research Grant | 103 | Allen |

**Research Objective Achievement Plan 56AAL: Economic Costs and Benefits of Air Pollution Control in St. Louis**

Objective: Description of how the economic important receptors are distributed within the region, description of how the human receptors are distributed by race, income and social class, a model that maps onto the receptors the benefits from any control program, a model that maps onto sources the distribution of costs of any control program, and methods of developing these models. Some of the cost and benefit functions may be transferable to other regions with only minor adjustments.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 56AAL-003 | Analyze first year health data, derive first round estimate of health benefit functions. These results could be used to modify RAPS monitoring network, reorder RAPS priorities of pollutants to monitor and transport processes to model, support EPA actions that cannot wait the completion of the RAPS project. | Contract | 103 | Allen |
| 56AAL-004 | Development of alternative control strategy specifications. | Contract | 103 | Allen |

## ECOLOGICAL PROCESSES AND EFFECTS PROGRAM AREA

### PROGRAM ELEMENT NO. 1AA006 – ECOLOGICAL EFFECTS OF AIR POLLUTION

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $135,000
Contracts: $ 52,000

Program Element Output: (1) Determination of the effects of air pollutants on biotic (crops, vegetation, domestic animals, and wildlife) and abiotic (soil, water, major natural and man-made materials) components of the environment; (2) Assessment of the effectiveness of control measures through monitoring of selected ecosystems such as urban oxidant complexes, fossil fuel combustion emission complexes, fluoride emission complexes and hydrocarbon emission complexes; in order to provide a better understanding upon which to base realistic control efforts through the setting of secondary ambient air quality standards and other control measures.

Program Element Director (PED):

Dr. Norman Glass
National Ecological Research Lab
National Environmental Research Center
Environmental Protection Agency
200 S.W. 35th Street
Corvallis, OR 97330
Telephone: (503) 752-4211

Dr. Paul Altshuller
Chemistry and Physics Laboratory
National Environmental Research Center
Environmental Protection Agency
Research Triangle Park, NC 27711
Telephone: (919) 549-8411

## PROGRAM ELEMENT NO. 1AA006

**Research Objective Achievement Plan 21ALU:** **Predictive Modeling of the Impact of Air Pollutants on Ecosystems**

Objective: A series of research reports on the modeling and experimental compartments of the program. These will include experimental data and predictive models for pollutant impact on biomass, population dynamics, succession and transport processes.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ALU-026 | To examine the biotransformation of specific pollutants by natural populations. | Research Grant | 103 | Glass |
| 21ALU-027 | Grant to study impact of coal-fired power plant on terrestial ecosystem. | Research Grant | 103 | Glass |
| 21ALU-031 | Grant to apply population dynamics models in ecosystem study. | Research Grant | 103 | Glass |

**Research Objective Achievement Plan 21BBK:** **Measurement of Ecosystem Response and Ecological Effects of Salt Water Drift**

Objective: Research reports, consultation for OEGC, enhance agency expertise in assessing environmental impact of power plants, assessment of general useability of ecological indices for enforcement and other agency users.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21BBK-003 | On-site assessment of effect of salt spray from salt water cooling tower and spray modules on potted cultivars placed at varying distances from salt spray source. | Contract | 103 | Glass |
| 21BBK-006 | Contract to conduct search and assessment of various quantitative measures of ecosystem responses to change. | Contract | 103 | Glass |

**PROGRAM ELEMENT NO. 1AA006**
**Research Objective Achievement Plan 21BBK**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21BBK-007 | Grant to conduct simulation studies to determine the sensitivity and variability of indices, and to relate indices to other chemical and physical characteristics of the marine environment. | Research Grant | 103 | Glass |

# ECOLOGICAL PROCESSES AND EFFECTS PROGRAM AREA

## PROGRAM ELEMENT NO. 1AA008 – FORMATION AND DECAY OF POLLUTANTS

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $934,000
Contracts: $384,000

Program Element Output: Improved understanding of the chemical and physical formation (and/or decay or removal) of important pollutants in the atmosphere. A knowledge of the details of how these pollutants react with each other, with the permanent atmospheric gases, with the sunlight, and the hydrosphere and biosphere will be compiled and used for establishing ambient air quality criteria and establishing a stronger foundation on which to base pollution control strategies and specific pollution control decisions. Among other things, this program will assess, by means of laboratory and field studies, the contribution of pollutants, through their atmospheric reactions, to the atmospheric loading of fine particulates.

Program Element Director (PED):

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National Environmental Research Center
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Mr. George Morgan
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## PROGRAM ELEMENT NO. 1AA008

**Research Objective Achievement Plan 21AKB: Determination of the Character and Origin of Aerosols**

Objective: Contribution of the major sources to atmospheric aerosols, quantitative descriptions of the generation and removal rates associated with each major source and sink, characterization of urban, natural, primary source and secondary source aerosols, scientific data for fine particle criteria and standards, quantification of the effects of aerosols on atmospheric chemical reactions.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AKB-006 | Aerosol formation from naturally emitted hydrocarbons. | Research Grant | 103 | Altshuller |
| 21AKB-008 | Organic analysis of atmospheric and laboratory aerosols. Determine detailed organic composition of aerosols formed from several model reaction systems and of primary automobile aerosols. Determine detailed organic composition of aerosol in several urban areas with different types of aerosols. Use information to deduce sources of secondary aerosol in urban areas. | Research Grant | 103 | Altshuller |
| 21AKB-024 | Relate fine particle aerosols to sources. Use size and composition data of source and atmospheric aerosols to determine sources of atmosphere aerosols. Recommend measurement needs for source characterization. Develop models of aerosol size distribution development. | Research Grant | 103 | Altshuller |
| 21AKB-031 | Aerosol optical characteristics. | Research Grant | 103 | Altshuller |
| 21AKB-041 | Theoretical development of aerosol dynamics to provide practical models that describe the growth of aerosol particles in the atmosphere, the evaluation of size distributions, and applications in air cleaning and health. | Research Grant | 103 | Altshuller |

**PROGRAM ELEMENT NO. 1AA008**
**Research Objective Achievement Plan 21AKB**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AKB-042 | Experimental laboratory studies of aerosol dynamics to test gas -to-aerosol conversion kinetics as a function of initial condensation nuclei concentration, the effect of coagulation with condensation on evolving size distribution and the effect of chemical composition. | Research Grant | 103 | Altshuller |
| 21AKB-043 | Model of aerosol formation, growth, and dynamics with applications. | Research Grant | 103 | Altshuller |
| 21AKB-045 | Support contract for aerosol studies. | Contract | 103 | Altshuller |
| 21AKB-048 | Reactions of gases on laboratory and inorganic atmospheric aerosols to determine rate limiting chemical processes, surface intermediates, and the influence of water intermediates, and the influence of water vapor. The data will be used to develop a gas-aerosol reactivity model. | Research Grant | 103 | Altshuller |
| 21AKB-049 | Surface reactive species on aerosols will be studied with ESR and IR to identify intermediates in gas-aerosol reactions. | Research Grant | 103 | Altshuller |

**Research Objective Achievement Plan 21AKC: Formation and Removal of Noxious Gases in the Atmosphere**

Objective: Reports on the chemical and physical processes involved in the formation, transport and removal of toxic and noxious substances in the atmosphere; insights into the self-cleaning properties of the atmosphere; rate and mechanism data for mathematical modeling of the polluted reacting air; realtionships between pollutants effects and emissions; control strategies for minimizing the formation of noxious gases in the atmosphere.

**PROGRAM ELEMENT NO. 1AA008**
**Research Objective Achievement Plan 21AKC**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AKC-002 | Study of hydrocarbons in the field. | Contract | 103 | Altshuller |
| 21AKC-003 | Chemistry of nitrogen compounds in air. | Contract | 103 | Altshuller |
| 21AKC-004 | Halogenated compounds in the atmosphere. | Research Grant | 103 | Altshuller |
| 21AKC-005 | Uptake of pollutants by vegetation. | Research Grant | 103 | Altshuller |
| 21AKC-010 | Los Angeles Reactive pollutant study. | Contract | 103 | Altshuller |
| 21AKC-020 | Gas phase ozonolysis. | Research Grant | 103 | Altshuller |
| 21AKC-021 | Support contract for photochemical studies. | Contract | 103 | Altshuller |
| 21AKC-023 | Photochemical model development. | Contract | 103 | Altshuller |
| 21AKC-024 | Experimental studies of control strategies. | Research Grant | 103 | Altshuller |
| 21AKC-025 | Formation mechanisms and structure of oxgenated compounds. | Research Grant | 103 | Altshuller |
| 21AKC-026 | Photochemistry of sulfur compounds and organics. | Research Grant | 103 | Altshuller |
| 21AKC-027 | Elemental reactions in polluted air. | Research Grant | 103 | Altshuller |
| 21AKC-028 | Smog chamber study of exceptional urban atmoshpere. | Contract | 103 | Altshuller |
| 21AKC-030 | Rate constant evaluation. | Research Grant | 103 | Altshuller |
| 21AKC-031 | Photoxidation products from aromatics. | Research Grant | 103 | Altshuller |
| 21AKC-035 | Analysis of atmoshperic gaseous pollution data. | Research Grant | 103 | Altshuller |

## PROGRAM ELEMENT NO. 1AA008

**Research Objective Achievement Plan 21AZJ: Determination of Oxidant-Precursor Relationships for Control Strategies**

Objective: Reports presenting the quantitative relationships among the oxidants and the oxidant precursors under various ambient conditions (e.g., among ozone, hydrocarbons, nitric oxide and nitrogen dioxide concentrations). Such information is to serve as scientific basis for recommending regulatory actions concerned with improvement of the oxidant related air quality.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AZJ-003 | Background hydrocarbons and oxidant transport. | Contract | 103 | Altshuller |
| 21AZJ-006 | Effect of emission control on oxidant hydrocarbon relationship. | Contract | 103 | Altshuller |
| 21AZJ-007 | Chamber support service contract. | Contract | 103 | Altshuller |

**Research Objective Achievement Plan 21AZM: The Effects of Aerosol Composition on Visibility**

Objective: Optical properties of primary and secondary aerosols; relationships between visibility loss and aerosol characteristics such as size, shape, and chemical composition; effect of relative humidity on aerosol properties, scientific data for visibility criteria and standards, data from which to derive pollution control strategies which will improve atmoshperic visibility.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AZM-009 | Study of aerosol formation as function of reactant concentration. | Research Grant | 103 | Altshuller |

# ECOLOGICAL PROCESSES AND EFFECTS PROGRAM AREA

## PROGRAM ELEMENT NO. 1AA009 – METEOROLOGICAL RESEARCH

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: NONE
Contracts: $145,000

Program Element Output: (1) Evaluation of the environmental quality and meteorological-climatological information needed for abatement and control actions; (2) development of analytical models to estimate the relationship between arbitrary distributions of pollution sources and the resultant air quality; and (3) evaluation of the impact of air pollutants on visibility, weather, and climate, at scales ranging from local to global dimensions.

Program Element Director (PED):

Mr. Lawrence Niemeyer
Meteorology Laboratory
National Environmental Research Center
Environmental Protection Agency
Research Triangle Park, NC 27711
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Mr. Richard W. Latimer
Arctic Environmental Research Laboratory
National Environmental Research Center
Environmental Protection Agency
College, AK 99701
Telephone: (907) 479–2251

## PROGRAM ELEMENT NO. 1AA009

**Research Objective Achievement Plan 06AJR:** **Determination of Pollutant Patterns and Levels From Large Power Plants**

Objective: A complete analysis of LAPPES data which will provide validated models of the transport and dispersion from large single sources, capable of calculating ground level concentrations of effluent from single sources with tall stacks. Information on the chemical transformation of pollutants within the effluent plume, based upon work performed by TVA under EPA sponsorship will also become available to modify the prediction equations.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 06AJR-005 | Development of techniques and concepts to model the influence of terrain on the three dimensional flow field and dispersion patterns of isolated point sources. | Contract | 103 | Niemeyer |
| 06AJR-006 | Evaluation of single source models for chemically active pollutants. | Contract | 103 | Niemeyer |

**Research Objective Achievement Plan 21ADO:** **Development, Evaluation, and Validation of Air Quality Models**

Objective: Models, describing the temporal and spatial variations in air quailty, will be developed and validated. To facilitate model applications, users will be provided access to models and data in storage at a central computer facility, when appropriate. These models will provide useful information on the effect of pollutant concentrations of prospective control strategy decisions or land-use-plans.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ADO-037 | Development of a source oriented operational statistical model for reactive pollutants for use in planning and to generate episodal warnings. | Contract | 103 | Niemeyer |

## PROGRAM ELEMENT NO. 1AA009

**Research Objective Achievement Plan 21AUS:** **Innovative Development in Air Quality Simulation Modeling**

Objective: Among the products and results of this ROAP will be new and improved concepts and methodolgies for the development and evaulation of air quality simulation models having a broader, more comprehensive capability to predict the air quality distribution under various emission, topographic, and meterological conditions. Special purpose models will be generated for the solution of special abatement and enforcement problems.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AUS-005 | Development of innovative numerical models utilizing spectral techniques, to include the simulation of chemical transformation within a turbulent fluid. | Contract | 103 | Niemeyer |

## ECOLOGICAL PROCESSES AND EFFECTS PROGRAM AREA

### PROGRAM ELEMENT NO. 1BA020 – ARGICULTURAL USES

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $17,000
Contracts: NONE

Program Element Output: Information required for the establishment of criteria that will provide a sound scientific basis for setting water quality standards for agricultural uses, including irrigation and the watering of livestock and poultry. Program effort will be directed to (1) determine more flexible criteria required to characterize water quality for irrigation use as modified by climate, soil factors, management practices, quality of water, kinds of crops; and (2) determine tolerance limits for herbicides transported in irrigation water from non-cropped areas to cropland. Included will be an examination of the effects and concentration of trace elements.

Program Element Director (PED):

Dr. Frank Wilkes
Ecological Processes and Effects Division
Office of Research and Development
Environmental Protection Agency
Xerox Building
Washington, DC 20460
Telephone: (703) 522–1826

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| PEMP-002 | Implement research activity to review research needs document. | Research Grant | 104b | Wilkes |

## ECOLOGICAL PROCESSES AND EFFECTS PROGRAM AREA

### PROGRAM ELEMENT NO. 1BA021 – FRESHWATER FISHES, OTHER FRESHWATER LIFE, AND WILDLIFE

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $145,000
Contracts: $358,800

Program Element Output: Valid criteria for setting water quality standards for the propagation of freshwater fishes and other aquatic life and wildlife. Program efforts will be directed to develop criteria for fishes, including anadromous fishes, and invertebrates and their food chain organisms, for such factors and pollutants as temperature and dissolved oxygen, heavy metals, pesticides, and constituents of complex organic effluents. Tolerance levels, safe levels, and long-term exposure effects will be determined.

Program Element Director (PED):

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National Water Quality Laboratory
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6201 Congdon Boulevard
Duluth, MN 55804
Telephone: (218) 727-6692

Mr. Richard W. Latimer
Arctic Environmental Research Laboratory
National Environmental Research Center
Environmental Protection Agency
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**PROGRAM ELEMENT NO. 1BA021**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| PEMP-033 | Symposium techniques and rational for evaluating safe levels of contaminants in freshwater environment. | Research Grant | 104b | Wilkes |

**Research Objective Achievement Plan 16AAE: Bioassay Technical Support for Freshwater Life**

Objective: Requested toxicology data will be used for meeting specific needs such as water quality standards, effluent criteria, approval of materials for use in products, or in waste treatment operations. Also recommendations for application of data are usually given.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 16AAE-015 | Conduct tissue and water analyses from selected toxicant exposure systems. | Contract | 104b | Mount |

**Research Objective Achievement Plan 16AAI: Development of Biological Test Methods**

Objective: Bioassay methods that can be used by many laboratories to determine ecological effects will be developed. These will then be prepared as manuals of bioassay methods or industry, regulatory agencies and contractors to use to determine effluent criteria, water quality standards and support pesticide registration. Better methods will also reduce EPA costs to measure effects.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 16AAI-015 | Contract – Ecosystem modeling. | Contract | 104b | Mount |

## PROGRAM ELEMENT NO. 1BA021

**Research Objective Achievement Plan 16AAK:** **Effect of Selected Hazardous Synthetic Organics in the Freshwater Environment**

Objective: Develop water quality criteria to protect freshwater aquatic organisms and man from pesticides and other toxic synthetic organics entering the environment. Through chronic and acute laboratory exposures of representative aquatic organisms, and appropriate tests to demonstrate field applicability, to provide information needed to recommend pesticide standards. New as well as insufficiently known older compounds are to be tested.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 16AAK-028 | Determine the chronic toxicity of several chlorinated hydrocarbons and organo-phosphate pesticides to the fish-food organism *Gammarus pseudolimnaeus*; this information is necessary to help develop water quality standards. | Contract | 104b | Mount |

**Research Objective Achievement Plan 16AAO:** **Complex Effluent Criteria**

Objective: Methods to establish guidelines and standards will be developed, tested, and made ready for use. Such methods can also be used to locate the most toxic components of waste discharges or the source of the most troublesome ones. As a by-product of this research information about the types of wastes tested will be available. A final product will be a handbook or guide for assessing effects of complex wastes on aquatic life.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 16AAO-009 | Fish flavor impairment studies. | Contract | 104b | Mount |
| 16AAO-012 | Conduct test of prototype system at Site 1. | Contract | 104b | Mount |
| 16AAO-020 | Conduct studies on feed samples to mammalian predator – initial contract to develop methodology. | Contract | 104b | Mount |

PROGRAM ELEMENT NO. 1BA021

**Research Objective Achievement Plan 16ABI:** **Temperature and Dissolved Oxygen Requirements for Freshwater Organisms**

Objective: Data will be developed and disseminated to Regional Offices of EPA for use in setting water quality standards and evaluation of environmental impact statements and to scientific journals for publication. The data developed will include that to be used in application of methods in the section on heat and temperature in the new edition of Water Quality Criteria Book.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 16ABI-016 | Development of remote sensors for locating fish in experimental channels. | Contract | 104b | Mount |
| 16ABI-023 | Operations costs of TVA - EPA Browns Ferry thermal research facility. | Research Grant | 104b | Mount |
| 16ABI-029 | Monticello project monitoring systems and fail-safe equipment. | Contract | 104b | Mount |

**Research Objective Achievement Plan 21ASA:** **Effects of Oil, Hydrocarbon Derivatives, and Dispersants on Arctic and Subarctic Freshwater Ecosystems Including Tundra**

Objective: Output will consist of a series of research reports and publications that will provide data upon which standards and criteria can be developed for the assessment of oil pollution incidents in the Arctic and Subarctic freshwater and tundra environments.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ASA-002 | The effects of oil spilled on the high latitude lake ecosystem. | Research Grant | 104b | Latimer |

# ECOLOGICAL PROCESSES AND EFFECTS PROGRAM AREA

## PROGRAM ELEMENT NO. 1BA022 – MARINE FISHES, OTHER MARINE LIFE AND WILDLIFES

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $ 80,000
Contracts: $460,600

Program Element Output: Valid criteria for setting water quality standards for the propagation of marine and estuarine fishes, invertebrates and their food chain organisms, and wildlife. Specific objectives include (1) determining safe levels of pesticides and pesticide derivatives in estuaries and coastal waters; (2) determining the effects of organic chemicals, heavy metals, petroleum and petroleum by-products on marine life; and (3) determining temperature and dissolved oxygen requirements for marine life. Acute and chronic effects of pollutants on the various life stages of the organisms will also be determined in order to specify safe levels of the pollutant involved.

Program Element Director (PED):

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National Marine Water Quality Laboratory
Environmental Protection Agency
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West Kingston, RI 02883
Telephone: (401) 789–9751

Mr. Richard W. Latimer
Arctic Environmental Research Laboratory
National Environmental Research Center
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## PROGRAM ELEMENT NO. 1BA022

**Research Objective Achievement Plan 16AAS: Effects of Free Chlorine and Chlorinated Compounds on Selected Marine Organisms**

Objective: Research reports describing the effects on marine life of chlorinated sewage and cooling water, the degrees of variation in effects to be expected within and between localities, toxic compounds formed, and recommendations for the protection of marine aquatic life subject to discharges or entrained in cooling water.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 16AAS-009 | Determine short-term biological effects on marine organisms and of selected compounds found in chlorinated waste treatment plant effluents. | Research Grant | 104b | Schneider |

**Research Objective Achievement Plan 16AAV: Effects of Petroleum, Oils, Oil Dispersants, and Petrochemical Wastes on Marine Life**

Objective: Research reports including recommendations for protecting the quality of the marine environment. The ecological impact and possible economic effect of oil spills would be included. Effects of waste oils will be evaluated.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 16AAV-008 | Analyze effluent from three ballast treatment facilities handling different types of crude and refined oils as well as sediments in areas of such discharges. Determine immediate and long-term chemical and physical fate of major boiling range fractions found. | Research Grant | 104b | Schneider |
| 16AAV-018 | Contract to conduct oiling of experimental field systems with refined and waste oils, sample sites and perform chemical analyses. | Contract | 104b | Schneider |

## PROGRAM ELEMENT NO. 1BA022

**Research Objective Achievement Plan 21AKF:** **Ecological Requirements Essential for the Protection of Estuarine and Marine Life**

Objective: Output will be in the form of a series of research reports and technical reports for protecting the quality of the marine environment. The ecological impact in altered levels of environment variables such as temperature, dissolved oxygen, and protecting salinity will be included. Basic requirements for culturing, holding, and marine species will be determined.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AKF-040 | Vital microscope development through research contract | Contract | 104b | Schneider |
| 21AKF-041 | Interface dissolved oxygen controls to simulation system. | Contract | 104b | Schneider |

**Research Objective Achievement Plan 21AKK:** **Biological Techniques for Water Quality Criteria Development**

Objective: Bioassay systems and techniques will be developed which permit interaction of test organism and test material in a manner closely approximating their natural encounter. Effect of necessary deviations on response will be determined. Methods and systesm will be such that they will be applicable to additional species as rapidly as environmental requirements and culture conditions can be determined for them. Test organisms will be chosen and tested for appropriateness to the anticipated fate of specific pollutants (at the time — pesticides, metals, complex wastes, and oils).

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AKK-017 | Establish and maintain a computerized file of latest data on biological response of aquatic organisms to environmental and/or chemical factors. | Contract | 104b | Schneider |

PROGRAM ELEMENT NO. 1BA022

**Research Objective Achievement Plan 21BBG: Ecological Assessment of Ocean Disposal**

Objective: Criteria, standards and procedures for assessing, predicting, and demonstrating environmental compromise due to ocean disposal practices. Regional support as well as direct technical assistance to states, municipalities, and industry will be a significant output. Scientific papers will be contributed to the academic community.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21BBG-001 | Locate and synthesize information from existing data bases and producers in relation to ecological assessment and physical-chemical surveys of the ocean. Assess results for useability in defining movement of dumped materials through the water column to the ocean floor and subsequent possible biological, physical, and chemical avenues of movement away from site of deposition. Determine physical-chemical composition of materials currently and historically disposed of in marine systems comparable to those being studied. | Contract | 104b | Schneider |
| 21BBG-002 | Identify a near-shore (estuarine), continental shelf and open ocean site and compare the biological effects of dumping between these sites. | Contract | 104b | Schneider |
| 21BBG-003 | Determine biological availability of materials contained in sewage sludge and dredge spoils from the East Coast of the U.S. Establish routes, rates, and mechanisms for the uptake of these materials. | Contract | 104b | Schneider |
| 21BBG-004 | Determine biological availability of materials contained in sewage sludge and dredge spoils from the West Coast of the U.S. Establish routes, rates, and mechanisms for the uptake of these materials. | Contract | 104b | Schneider |
| 21BBG-005 | Monitor and record conditions at study sites over time. | Contract | 104b | Schneider |

**PROGRAM ELEMENT NO. 1BA022**
**Research Objective Achievement Plan 21BBG**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21BBG-007 | Develop bioassay methods for ocean dumping. | Contract | 104b | Schneider |
| 21BBG-009 | Issue contract in support of developing site monitoring methods. | Contract | 104b | Schneider |

## ECOLOGICAL PROCESSES AND EFFECTS PROGRAM AREA

### PROGRAM ELEMENT NO. 1BA023 – FATE OF POLLUTANTS IN FRESH SURFACE WATERS

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $ 56,000
Contracts: $300,000

Program Element Output: Scientific basis for predicting and assessing the fate of pollutants (municipal, industrial, agricultural, etc.) which enter fresh surface waters and the potential exposure of human and aquatic life to these pollutants. This program will examine the distribution, the pathways, and the rates of movement, accumulation and degradation of pollutants in fresh surface water systems, including the chemical, physical and biological factors which influence these phenomena. As a result of this effort, mathematical models will be developed which interrelate components and processes of aquatic ecosystems, and data will be provided to support the formulation of rational water quality standards.

Program Element Director (PED):

Dr. David W. Duttweiler
Southeast Environmental Research Lab
Environmental Protection Agency
College Station Road
Athens, GA 30601
Telephone: (404) 546-3134

## PROGRAM ELEMENT NO. 1BA023

**Research Objective Achievement Plan 21AIM:** **Fate and Impact of Selected Pollutants in Freshwater Ecosystems**

Objective: Research reports describing the physical, chemical, and biological transport transformations and degradation of specific classes of pollutants having significant environmental impact. Theoretical mathematical models to predict the fate of these pollutants when discharged into fresh surface water ecosystems within representative biomes. Computer programs and user manuals will be provided under Technical Assistance Plan.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AIM-032 | Grant to conduct research workshop on chemical and photochemical degradation of pollutant pesticides in soils. | Research Grant | 104b | Duttweiler |
| 21AIM-033 | Grant to determine chemical and photochemical degradation kinetics and product formation for selected pesticides on soil. | Research Grant | 104b | Duttweiler |

**Research Objective Achievement Plan 22AEC:** **Non-Point Water Pollution Source Simulation Models**

Objective: Simulation models for use in estimating pollution contributions (quantitatively and qualitatively) from each major category of non-point pollution sources and in identifying monitoring requirements to assess pollution contributions from any given specific non-point source.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 22AEC-002 | Contract to develop loading model for non-point source pollution for selected priority category and river basin. | Contract | 104b | Duttweiler |

## ECOLOGICAL PROCESSES AND EFFECTS PROGRAM AREA

### PROGRAM ELEMENT NO. 1BA024 - FATE OF POLLUTANTS IN GROUND WATERS

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $ 50,000
Contracts: $108,000

Program Element Output: Determination and quantification of the fate of pollutants entering and traversing a ground water resource domain. Program effort will be to: (1) determine the national scope and nature of ground water pollution problems; (2) establish scientific criteria for waste disposal site selection; (3) determine the effects of surface pollution on ground water quality; (4) develop water quality monitoring and management methods for ground water environments; and (5) develop sub-surface waste disposal deep well injection, waste treatment lagoons, or solid waste landfills.

Program Element Director (PED):

Mr. William C. Galegar
Robert S. Kerr Environmental Research Lab
National Environmental Research Center
Environmental Protection Agency
P.O. Box 1198
Ada, OK 74820
Telephone: (405) 332-8800

## PROGRAM ELEMENT NO. 1BA024

### Research Objective Achievement Plan 16AJB: Criteria and Parameters for Ground Water Basin Management

Objective: A series of reports evaluating existing hydrologic and pollution transport models and existing institutional constraints applicable to systematic groundwater basis management.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 16AJB-001 | Evaluate existing groundwater quantity and quality models by placing them in competition, one against the other, using data new to all systems. Select best model or point out areas of needed additional work. | Research Grant | 104b | Galegar |

### Research Objective Achievement Plan 21AIO: Nationwide Assessment of Ground Water Pollution Problem

Objective: Determine ground-water quality problems in the various regions of the U.S. Conduct ground-water quality symposia for technology transfer.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AIO-005 | Assess groundwater problems in northwest states. | Contract | 104b | Galegar |
| 21AIO-009 | Assess groundwater problems in southeastern states. | Contract | 104b | Galegar |

# ECOLOGICAL PROCESSES AND EFFECTS PROGRAM AREA

## PROGRAM ELEMENT NO. 1BA025 – FATE OF POLLUTANTS IN MARINE WATERS

Funds: Available as of November 3, 1973 for support of listed tasks:
Grants: $ 60,000
Contracts: $180,000

Program Element Output: Scientific basis for predicting and assessing the fate of pollutants discharged directly or indirectly into marine waters, and development of techniques for marine environmental quality enhancement. This program determines the distribution, the pathways, and the rates of movement, accumulation and degradation of pollutants in oceanic waters. Specific objectives include, but are not limited to: (1) establishing scientific criteria for marine disposal site selection and optimum disposal methods; (2) characterizing the pollutional nature of wastes, sludges and debris discharged in the sea; and (3) developing monitoring methods for waste disposal operations.

Program Element Director (PED):

Dr. Norbert A. Jaworski
Pacific Northwest Environmental Research Lab
National Environmental Research Center
Environmental Protection Agency
200 S.W. 35th Street
Corvallis, OR 97330
Telephone: (503) 752-4211

## PROGRAM ELEMENT NO. 1BA025

**Research Objective Achievement Plan 21AIS: Scientific Criteria for Ocean Disposal**

Objective: Reports recommending (1) maximum permissible environmental levels of pollutants and water quality criteria for specific marine uses, (2) maximum effluent concentrations for marine discharges, (3) acceptable discharge locations for allowable materials, (4) laboratory and field measurement techniques necessary for pre-and post-discharge evaluation, and (5) possible controls of atmospheric riverine inputs.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AIS-072 | Participation in round-robins and other lab and field activities associated with improvement of analytical methods, sampling procedures, and sample handling procedures for marine samples. Major effort to be shared with contractor. | Contract | 104b | Jaworski |
| 21AIS-073 | Method development for specific wastes and waste constituents. | Contract | 104b | Jaworski |
| 21AIS-075 | Field verification of near-field dispersion model for waste discharges with particulate and floatable constituents. Principal effort will be to provide oceanographic vessel and staging area for in-house personnel, and to arrange for experimental dumping. | Contract | 104b | Jaworski |
| 21AIS-079 | Develop methodology for evaluation and assessment of the bioaccumulatory nature of specific industrial waste constituents (two-year program). Precise requirements will be issued in an RFP to be prepared after review of interim report on bioassay techniques is issued by OR&D in August 1973. | Contract | 104b | Jaworski |

## PROGRAM ELEMENT NO. 1BA025

**Research Objective Achievement Plan 21AIT:** **Pollutant Dynamics in the Ocean Environment**

Objective: Federal, State, and local regulatory agencies will use these predictive models to establish water quality standards, to estimate the impact of potential pollution sources, and to design and implement appropriate pollution control procedures.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AIT-042 | Oceanic driving of deep-basin flushing and coupling with upper-zone coupling with circulation features. Verification of vertical circulation features and biodynamics in an NSF-supported field experiment. | Research Grant | 104b | Jaworski |

## ECOLOGICAL PROCESSES AND EFFECTS PROGRAM AREA

### PROGRAM ELEMENT NO. 1BA026 – FATE OF POLLUTANTS IN LARGE LAKES

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $1,381,000
Contracts: NONE

Program Element Output. Scientific basis for predicting and assessing the fate of pollutants in large lakes. Program efforts will be directed towards the development of methodology and information for lake water quality enhancement. Pollution problems of concern include: nutrient enrichment and eutrophication, aquatic weed control, bank erosion and sedimentation, dredge spoils disposal, and industrial waste effects. Development and improvement of mathematical models for lake water quality management is an important sub-objective. (This program is applicable to large lake systems such as the Great Lakes, Great Salt Lake, and the Finger Lakes.)

Program Element Director (PED):

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Environmental Protection Agency
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Grosse Ile, MI 48138
Telephone: (313) 675-5000

## PROGRAM ELEMENT NO. 1BA026

### Research Objective Achievement Plan 21AKP: Dynamics of Chemical, Physical, and Biological Processes Affecting Pollution of Large Lakes

Objective: A series of math models will be developed with the complexity of large lakes system dictating the time frame of development. Initially models for predicting control measures for nutrients, waste heat and hazard material will be attempted. The long range output will be general ecological models for large lakes system.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AKP-018 | Develop models for physical factors affecting pollutant transport. | Research Grant | 104b | Davies |
| 21AKP-019 | Begin model adaptation for other large lakes. | Research Grant | 104b | Davies |
| 21AKP-023 | Atmospheric and diffuse source studies. | Research Grant | 104b | Davies |

### Research Objective Achievement Plan 21BAZ: Support of the United States-Canada Upper Lakes Reference Study

Objective: This ROAP is to readjust large lakes research effort to the correct target level. The money in this ROAP was subject to reprogramming during the establishment of target levels and the reprogramming was subsequently rejected. This ROAP will develop the basic knowledge of the Upper Great Lakes which will be used by the IJC in its reports to the U. S.-Canadian Governments to develop baseline management strategies outlined in the U. S.-Canada agreement.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21BAZ-002 | Conduct a series of biological studies on Saginaw Bay to define present water qulaity and the effect of Saginaw Bay on Lake Huron. | Research Grant | 104b | Davies |
| 21BAZ-005 | Conduct chemical investigation of Saginaw Bay to provide nutrient subject data and to define water quality. | Research Grant | 104b | Davies |
| 21BAZ-007 | Conduct an investigation of the effect of the movement of water from Lake Michigan to Lake Huron. | Research Grant | 104b | Davies |

## PROGRAM ELEMENT NO. 1BA026

**Research Objective Achievement Plan 21BBI: Comprehension of the Michigan-Huron-Superior Lake Systems**

Objective: An analysis and model development of the physical, chemical and biological processes, in Superior and Huron, with extension to Lake Michigan, as they affect water quality. This will allow a prediction of future water quality and be the basis for developing an adequate management strategy.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21BBI-003 | Southern Lake Huron Framework – Reference Studies – Phytoplankton. | Research Grant | 104b | Davies |
| 21BBI-004 | Other complementary biological studies – Zooplankton. | Research Grant | 104b | Davies |
| 21BBI-005 | Studies on the water chemistry of Southern Lake Huron. | Research Grant | 104b | Davies |
| 21BBI-006 | Accelerated program for evaluating Lake Michigan as a source of pollutants to Lake Huron. | Research Grant | 104b | Davies |
| 21BBI-008 | Initiate model development. | Research Grant | 104b | Davies |

**Research Objective Achievement Plan 25ADR: Guidelines for Controlling Nutrients In Large Lakes**

Objective: A series of technical reports will be developed documenting the various aspects of the nutrient control research program. Separate reports on sources, transport mechanism, impact of nutrients, and guidelines for control will be developed.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 25ADR-009 | Conduct a taxonomy survey of the near-shore algal growths in the Great Lakes to form a baseline before nutrient control program is instituted. | Research Grant | 104b | Davies |
| 25ADR-010 | Conduct nutrient growth requirement study of *Cladophora* and other near-shore nuisance aquatics. | Research Grant | 104b | Davies |

# ECOLOGICAL PROCESSES AND EFFECTS PROGRAM AREA

## PROGRAM ELEMENT NO. 1BA031 - EUTROPHICATION AND LAKE RESTORATION

Funds: Available as of November 3, 1973 for support of listed tasks
Grants: $55,000
Contracts: $20,000

Program Element Output: Development of eutrophication controls and restoration procedures for the lakes and ponds of North America. Specific objectives include: (1) development of an understanding of the eutrophication process with emphasis on the role of plant nutrients in aquatic systems, nutrient cycling among water, sediments and biota, and nutrient effects on plant growth; (2) development and demonstration of technology to control and reverse eutrophication processes; and (3) development of methods for monitoring eutrophication conditions and for predicting impact of nutrient sources on the eutrophication of natural waters.

Program Element Director (PED):

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Pacific Northwest Environmental Research Lab
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Environmental Protection Agency
200 S.W. 35th Street
Corvallis, OR 97330
Telephone: (503) 752-4211

**PROGRAM ELEMENT NO. 1BA031**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| PEMP-003 | Conduct literature survey of biological control methods applicable to eutrophic aquatic ecosystems, including plant and animal harvesting. | Research Grant | 104b | Wilkes |

**Research Objective Achievement Plan 21AIY: The Determination of the Effectiveness of Lake Restoration Procedures**

Objective: Lake restoration manuals including engineering and limnological research reports offering guidelines for the selection and application of the various restorative techniques in lakes of differing types.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AIY-035 | Assessment and evaluation study for design of experimental ponds, including water supply and drainage systems. | Contract | 104b | Jaworski |
| 21AIY-040 | Manipulation of natural systems to control aquatic plant growth. | Research Grant | 104b | Jaworski |

**Research Objective Achievement Plan 21AJA: Predictive Descriptions of the Eutrophication Process**

Objective: A series of predictive models which define the chemical, physical and biological components and their effects on the eutrophication of lakes and estuaries.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AJA-017 | Consulting cost needed in developing mathematical models. | Contract | 104b | Jaworski |

## ECOLOGICAL PROCESSES AND EFFECTS PROGRAM AREA

### PROGRAM ELEMENT NO. 1BA032 – THERMAL POLLUTION RESEARCH

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $ 60,000
Contracts: See **RFP** when issued.

Program Element Output: Improved scientific basis for predicting and assessing the amount, behavior, and non-organic effects of heat discharged to the aquatic environment. The development of environmental systems for safe management of heated discharges, including siting requirements for heat discharging plants and beneficial environmental uses of otherwise wasted heat, will also be undertaken.

Program Element Director (PED):

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## PROGRAM ELEMENT NO. 1BA032

**Research Objective Achievement Plan 21AJH: Dynamics for Thermal Pollution**

Objective: Critique of, or supplemental State-of-the-art report to, the 270-day report to Congress (Sec. 104). Reports, mathematical models, computer programs and/or nomograph solutions for predicting (a) physical dispersion and dissipation of heat and ancillary cooling wastes discharged to water and atmoshpere, (b) biological impacts of cooling water intake structures and (c) response of biochemical and biologic systems.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AJH-013 | Analysis of submerged multiple sort diffusers. | Research Grant | 104b | Jaworski |
| 21AJH-020 | Computer contract. | Contract | 104b | Jaworski |
| 21AJH-034 | Field test cooling tower plume model. | Research Grant | 104b | Jaworski |

## ECOLOGICAL PROCESSES AND EFFECTS PROGRAM AREA

### PROGRAM ELEMENT NO. 1DB063 - COLLECTION AND PROCESSING

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: **NONE**
Contracts: $200,000

Program Element Output: (1) Storage, collection, and transportation, health and environmental effects, and technology assessment for both residential and commercial solid waste management; (2) new or improved processes for safe and efficient reduction of the amounts of solid wastes which must be disposed, including combustion, densification and separation of systems. These processes and technologies will be used for the purpose of establishing standards and for planning and implementing programs relating to ultimate disposal and recycling schemes. Baseline operating conditions for incinerators, the characteriaztion of incinerator emissions, and design and use data for incineration of solid wastes and hazardous materials will be provided.

Program Element Director (PED):

Mr. Robert Stenburg
Solid and Hazardous Waste Research Lab
National Environmental Research Center
Environmental Protection Agency
Cincinnati, OH 45268
Telephone: (513) 684-4477

## PROGRAM ELEMENT NO. 1DB063

**Research Objective Achievement Plan 24ALL:** **Determine and Evaluate the Environmental Effects of Processing Hazardous and Toxic Wastes**

Objective: Achievement of desired output will establish the quality and quantity of toxic components emitted from incinerators and other facilities processing municipal and industrial wastes. It will also establish operating conditions required to minimize and control their harmful effects. Minimum output will define the magnitude of the incinerator emissions problem.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 24ALL-013 | To establish the combustion conditions necessary to burn pesticides safely. | Contract | 204 | Stenburg |
| 24ALL-014 | To conduct case studies documenting damages caused by improper disposal of selected hazardous materials. | Contract | 204 | Stenburg |
| 24ALL-015 | To conduct case studies of engineered storage of hazardous materials. | Contract | 204 | Stenburg |

## ECOLOGICAL PROCESSES AND EFFECTS PROGRAM AREA

### PROGRAM ELEMENT NO. 1DB064 – DISPOSAL TECHNOLOGY

Funds: Available as of November 3, 1973 for support of listed Tasks:

| | |
|---|---|
| Grants: | $125,500 |
| Contracts: | $469,000 |

Program Element Output: Guidelines and/or policy decisions for sanitary landfill design, construction, and operation for hazardous industrial and municipal wastes. Recommendations will be developed relative to dry versus wet land disposal and cover versus no cover landfill practices. Program efforts will produce methods for identification and control of gases and methods for the control and treatment of leachate. Reports will be compiled on pathogen survival, movement and control; and design criteria will be established for settlement. Disposal options such as deep well injection, salt mine and others will be evaluated in terms of hazardous waste material disposal. This program will be conducted at both laboratory and field sites. An evaluation of transport phenomena of hazardous materials through the soil media, soil moisture holding capacity, and environmental effects of sludge disposal in sanitary landfills will be provided.

Program Element Director (PED):

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Cincinnati, OH 45268
Telephone: (513) 684-4477

## PROGRAM ELEMENT NO. 1DB064

**Research Objective Achievement Plan 17BAZ:** **Determine and Evaluate the Environmental Effects of Leachates Generated by Landfill**

Objective: A series of reports that document: (1) the quality and quantity of landfill leachate for a range of climatic conditions; (2) leachate analytical and surveillance techniques; (3) role and capability of soils in minimizing effects of migrating leachate; (4) factors to be controlled in minimizing harmful leachate effects, and (5) treatability of leachate. The series will be followed by a comprehensive summary report with recommendations for leachate management at sanitary landfills. In addition, the transport mechanisms of hazardous materials disposed by sanitary landfill will be determined.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 17BAZ-014 | Develop and evaluate predictive models of moisture movement in landfill cover material. | Contract | 204 | Stenburg |
| 17BAZ-018 | Evaluate and document post cases of transport of hazardous materials through the soil, water, and/or air media. | Contract | 204 | Stenburg |
| 17BAZ-019 | Survey literature of hazards associated with land disposal of hazardous wastes. | Contract | 204 | Stenburg |
| 17BAZ-023 | Provide laboratory analytical services for leachate analysis. | Contract | 204 | Stenburg |
| 17BAZ-024 | Determine influence of rainfall on leachate production for different climatic conditions. | Contract | 204 | Stenburg |

**Research Objective Achievement Plan 24AAG:** **Determine and Evaluate Environmental Effects of Gases Generaged in Solid Waste Landfills**

Objective: A series of reports to document: (1) the effects and significance of aerosols at landfills; (2) a rational, predictive method for determining the extent of gas migration at proposed and existing sanitary landfill sites, and (3) standard methods for monitoring sanitary landfill sties, including sample location, collection, and analysis.

**PROGRAM ELEMENT NO. 1DB064**
**Research Objective Achievement Plan 24AAG**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 24AAG-006 | Determine gas production quality and quantity from shredded and baled solid waste under a variety of climatic conditions. | Research Grant | 204 | Stenburg |
| 24AAG-010 | Determine gas production rates for a variety of field conditions. | Contract | 204 | Stenburg |
| 24AAG-011 | Provide laboratory analytical services. | Contract | 204 | Stenburg |

**Research Objective Achievement Plan 24ALH: Determine and Evaluate the Environmental Effects of Sludge and Hazardous Waste Disposal by Sanitary Landfill**

Objective: A series of reports will document the environmental effects of domestic wastewater sludge disposal by sanitary landfill. Criteria will be developed whereby all sludges, liquids, brines, and solids from water treatment plants, air pollution control devices, hazardous spill abatement residues, and industrial wastes can be evaluated to determine the environmental effects of disposal by sanitary landfill.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 24ALH 003 | Evaluate the transport phenomena of hazardous materials through the soil media. | Contract | 204 | Stenburg |
| 24ALH-004 | Determine effect of disposing of domestic wastewater treatment sludges in sanitary landfills. | Contract | 204 | Stenburg |
| 24ALH-010 | Conduct pilot scale evaluation of selected hazardous sludges, fixed liquid waste and pollution abatement residue disposal by sanitary landfill. | Contract | 204 | Stenburg |
| 24ALH-011 | Determine leachate characteristics from land disposal of hazardous sludges, chemically fixed liquid wastes, and air/water pollution abatement residues. | Contract | 204 | Stenburg |

## PROGRAM ELEMENT NO. 1DB064

### Research Objective Achievement Plan 24ALU: Disposal of Infectious Waste

Objective: Emission measurements will be obtained from hospital and sewage sludge solid waste processing systems. Potential health effects indicators, functional and environmetal conditions that affect the disease potential, and the recommended final criteria for the safe collection and handling of infectious wastes will be developed and documented. Interim reports providing health effects evaluations for hospital waste processing and disposal systems and sewage sludge solid waste disposal systems will provided.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 24ALU-003 | Conduct field studies to evaluate pathogen hazards associated with landfilling:<br>a. Determine pathogen content in leachates and/or aerosols from land-filled hospital and municipal waste mixtures.<br>b. Determine pathogen content in leachates from landfilled residues of hospital and sewage sludge inceneration.<br>c. Determine pathogenic movement through surrounding soil media from landfills of infectious waste materials. | Research Grant | 204 | Stenburg |
| 24ALU-004 | Conduct field studies to evaluate by microbiological means the efficacy of hospital waste incinerators and sewage sludge incinerators and determine health indicators.<br>a. Analyze hospital waste and sewage sludge prior to incineration.<br>b. Quantify microorganisms in residues.<br>c. Quantify microorganisms in stack emissions. | Contract | 204 | Stenburg |

## ECOLOGICAL PROCESSES AND EFFECTS PROGRAM AREA

### PROGRAM ELEMENT NO. 1DB311 – HAZARDOUS SOLID WASTES

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: **NONE**
Contracts: $180,000

Program Element Output: Safe and effective techniques for the characterization, collection, treatment and disposal of hazardous waste materials. These wastes may include, among others: industrial and chemical wastes, hospital wastes, pathogenic wastes, pesticides and pesticide containers. Data necessary for standard and guideline formulation will be developed and evaluated. Health effects and transport processes related to the above will be investigated and assessed.

Program Element Director (PED):

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Solid and Hazardous Waste Research Lab
National Environmental Research Center
Environmental Protection Agency
Cincinnati, OH 45268
Telephone: (513) 684-4477

## PROGRAM ELEMENT NO. 1DB311

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| PEMP-002 | Award and Monitor Planning Contract for Development of Hazardous Waste Program Plan. | Contract | 204 | Wilkes |

**Research Objective Achievement Plan 07ADZ:** **Evaluation and Development of Processes to Minimize and Control the Toxic Effects of Hazardous Materials**

Objective: Successful completion of the program will provide acceptable solution for detoxifying hazardous materials, thus minimizing and controlling their deleterious effects on the environment. Achievement of desired output will result in prototypes of new, improved detoxification processes and provide for the assessment and control of hazardous materials in the environment. Minimum output required is to evaluate existing inadequate detoxification processes and to establish the feasibility for developing improved processes.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 07ADZ-004 | Assessment of techniques for the detoxification of selected hazardous materials. | Contract | 204 | Stenburg |

## ECOLOGICAL PROCESSES AND EFFECTS PROGRAM AREA

### PROGRAM ELEMENT NO. 1DB314 – RESOURCE RECOVERY TECHNOLOGY

Funds: No extramural Tasks remaining which are planned for funding in the current Fiscal Year.

Program Element Output: (1) Methods and implementation-activities which will stabilize the quantities of solid waste being generated; (2) systems which will allow greater percentages of solid waste material collected to be recycled by energy recovery, materials reuse, and materials conversion. Emphasis will be placed on shifting the relative economics of resource recovery by internalizing the external costs involved in virgin materials extraction and processing and in disposal. Safe recovery of hazardous wastes as an option to disposal will be investigated. Use of solid waste as a fuel in energy recovery incinerators is investigated.

Program Element Director (PED):

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## ECOLOGICAL PROCESSES AND EFFECTS PROGRAM AREA

### PROGRAM ELEMENT NO. 1EA077 – PESTICIDES ECOLOGICAL EFFECTS RESEARCH

Funds: Available as of November 3, 1973 for support of listed Tasks:

Grants: $112,500
Contracts: $225,000

Program Element Output: (1) Information essential for the pesticide registration and control programs; and (2) Supporting data for the development of water quality criteria for aquatic life. The program will consider the effects of toxic organics, the interactive effects of pesticides or combinations of other pollutants such as pesticides and heavy metals and the ecological tolerance levels and effects of sublethal concentrations of pesticides upon aquatic ecosystems. Investigations will be conducted on terrestrial, freshwater, estuarine, and marine flora and fauna.

Program Element Director (PED):

Dr. Thomas W. Duke
Gulf Breeze Environmental Research Laboratory
Environmental Protection Agency
Sabine Island
Gulf Breeze, FL 32561
Telephone: (904) 932-5326

PROGRAM ELEMENT NO. 1EA077

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| PEMP-011 | Workshop – The Use of Systems Analysis to Predict the Effects of Pollutants on Estuarine Ecosystems. | Research Grant | 20 | Wilkes |

**Research Objective Achievement Plan 10AKC: Effect of Selected Hazardous Organics on the Ecology of the Environment**

Objective: Direct input into establishment of water quality criteria and label registration of pesticides. Provide basic understanding of movement of pesticides in the marine environment, and provide methods for evaluation of effects. These data will continue to flow from the research throughout the period of study. Generate systems analysis models of effects of toxic organics in estuaries for use by the proper agencies which deal with water quality standards and label registration.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 10AKC-033 | Effects of mirex and carbofuran on estuarine microorganisms. | Contract | 20 | Duke |
| 10AKC-034 | Uptake and effects of mirex, methoxychlor, 2, 4-D and Aroclor 1016 on *Sargassum sp.* | Contract | 20 | Duke |
| 10AKC-036 | Chronic and acute toxicity of methoxychlor, malathion, carbofuran to sheepshead minnows. | Contract | 20 | Duke |
| 10AKC-037 | Insecticide effects on larval development of blue crab. | Research Grant | 20 | Duke |
| 10AKC-038 | Herbicide toxicity in mangroves. | Research Grant | 20 | Duke |
| 10AKC-040 | Effect of pesticides on the gray mullet. | Research Grant | 20 | Duke |

## PROGRAM ELEMENT NO. 1EA077

**Research Objective Achievement Plan 25AJN:** **Effects of Specific Biotic and Abiotic Factors on Estuarine Ecosystems**

Objective: An assessment of the possible impact of application of dense populations of microorganisms to the marine environment (e.g. after oil spills and after use as pesticides) will result and will be important for future planning. This ROAP will provide data additive or synergistic toxic effects of oil, pesticides and heavy metals on marine organisms in relation to selected environmental parameters. The data generated will be used for setting of water quality standards and in pesticide registration. It will be pertinent to federal and state agencies.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 25AJN-010 | Assessment of current use and possible impact of microbial seed cultures in estuarine ecosystems. | Contract | 20 | Duke |

# ECOLOGICAL PROCESSES AND EFFECTS PROGRAM AREA

## PROGRAM ELEMENT NO. 1EB080 – ALTERNATIVE METHODS OF PEST CONTROL

Funds: Available as of November 3, 1973 for support of listed tasks:
Grants: $215,000
Contracts: **NONE**

Program Element Output: Methods of pest control which will cause significantly less environmental disruption than that caused by currently available pesticides. Research topics include, among others, biological control of pests, genetic manipulations of pest and target organisms, use of pheromones in insect population management, cropping practices in regard to pest ecology, economic aspects of crop losses and means of integrating various methods for effective control. This program is closely coordinated with the National Science Foundation and the U.S. Department of Agriculture.

Program Element Director (PED):

Mr. Robert A. Papetti
Ecological Processes and Effects Division
Office of Research and Development
Environmental Protection Agency
Xerox Building
Washington, DC 20460
Telephone: (703) 522-5651

**PROGRAM ELEMENT NO. 1EB080**

**Research Objective Achievement Plan 06ALI:** **Strategies, Tactics, and Effects of Pest Population Regulation and Control in Major Crop Ecosystems**

Objective: Reports treating insect population interaction; economic injury thresholds social economic and systems analysis of pest management; use of natural enemies and plant resistance; cultural and physical control methods; biochemical aspects of insect behavior; use of sterile insect releases and other genetic tools; use of insect hormone chemicals; and, selective use of pesticides in conjunction with other measures.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 06ALI-003 | Economic impact of alternative pest management options. | Research Grant | 20 | Wilkes |
| 06ALI-004 | Effects of alternative pest urban, suburban,and/or rural practices. | Research Grant | 20 | Wilkes |
| 06ALI-005 | Study of bionomics and management corn and vegetable crops. | Research Grant | 20 | Wilkes |
| 06ALI-006 | Study of propagation of insect viruses as potential biological controls of undesirable insects. | Research Grant | 20 | Wilkes |
| 06ALI-007 | Studies on pheromone and/or insect hormones. | Research Grant | 20 | Wilkes |

# ECOLOGICAL PROCESSES AND EFFECTS PROGRAM AREA

## PROGRAM ELEMENT NO. 1FA083 – RADIATION PATHWAYS RESEARCH

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: **NONE**
Contracts: $67,000

Program Element Output: Information on the behavior, movement, and fate of radionuclides in the aquatic, terrestrial and air environments which will be useful for the purpose of assessing the radiation dose to man resulting through these multiple pathways. Laboratory surveys of the pathways by which radionuclides move through the environment of man will provide a basis for setting radiation protection guides and standards, particularly for nuclear power facilities.

Program Element Director (PED):

Dr. R. John Garner
Experimental Biology Laboratory
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Telephone: (919) 549–8411

George Morgan
Monitoring Systems Research & Development Lab
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P. O. Box 15027
Las Vegas, NV 89114
Telephone: (702) 736–2969

## PROGRAM ELEMENT NO. 1FA083

**Research Objective Achievement Plan 21BAS: Biological Availability of Plutonium and Iodine**

Objective: A series of research reports on environmental transport of these radionuclides which define parameters for population exposure models. The parameters will be related to the various types of environments typical of regions near emission sources. Plutonium will receive primary emphasis, however, long-lived iodine-129 and americium-241, the radioactive daughter of plutonium-241, will be studied concurrently.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21BAS-002 | Contracts for state-of-the-art reports on Pu, I and Am. | Contract | 301 | Morgan |
| 21BAS-013 | Contract for studies of physical and chemical characteristics of Pu and I released from nuclear facilities in remote locations. | Contract | 301 | Morgan |

## ECOLOGICAL PROCESSES AND EFFECTS PROGRAM AREA

### PROGRAM ELEMENT NO. 1HA10L – TOXIC SUBSTANCES ECOLOGICAL EFFECTS RESEARCH

Funds: No extramural Tasks remaining which are planned for funding in in the curent Fiscal Year.

Program Element Output: An evaluation of the ecological impact on ecosystems of the introduction of toxic substances into the environment, including terrestrial and aquatic environments and their interfaces. Specific objectives include: (1) development and evaluation of data on the effects on plants and animals of exposure to toxic substances; (2) determination of the chronic effects on ecosystems of both continuous and brief exposure to toxic substances with other chemicals and/or other parameters. Criteria for these effects include, but are not limited to, species diversity, energy flow, production and degradation of metabolic products.

Program Element Director (PED):

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Ecological Processes and Effects Division
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Environmental Protection Agency
Xerox Building
Washington, DC 20460
Telephone: (703) 522-1826

# ECOLOGICAL PROCESSES AND EFFECTS PROGRAM AREA

## PROGRAM ELEMENT NO. XF1107 – AEC ANIMAL INVESTIGATION PROGRAMS

Funds: No extramural Tasks remaining which are planned for funding in in the current Fiscal Year.

Program Element Output: An evaluation of the uptake and distribution of radionuclides in tissue and bone samples from domestic and game animals in the environs of nuclear testing. Knowledge of the tissue distribution of radionuclides in the animals, in areas adjacent to nuclear testing sites will provide input into a review of design and testing criteria.

Program Element Director (PED):

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Monitoring Systems Research & Development Lab
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# MUNICIPAL POLLUTION CONTROL PROGRAM AREA

The Municipal Pollution Control Program Area covers the research, development and demonstration of new or improved technology applicable to the control and treatment of wastewaters generated in and discharged from the urban environment. Pertinent technical areas include unit processes and systems applicable to treatment of municipal sewage to effect the removal of organic materials and other pollutants; control and treatment of wastewaters discharged from sewer systems carrying both storm water and sewage (combined sewers) and urban storm water discharges. The entire urban drainage system is, therefore, included in the Municipal Water Control Technology Program.

Beyond the basic development and demonstration of processes and systems, efforts are also directed to process control and instrumentation, computerized systems for process simulation and evaluation and non-pollutional disposal and/or utilization of sludges and concentrated pollutants resulting from treatment.

Several specialized areas of emphasis are included in the Municipal Water Control Technology Area. The treatment of municipal wastewaters in cold climates (sub-arctic and arctic areas) is one of these. A unique portion of this cold climate research and development is directed to the provision of effective water supply, wastewater treatment and general sanitation facilities for native Alaskan villages.

The treatment and utilization of both liquid and solid fractions of wastewater by application to the soil is a separately identified technical area, as is the improvement of existing and development of new treatment and disposal methods applicable for individual home use.

Program Area Manager (PAM):

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Municipal Pollution Control Division
Office of Research and Development
Environmental Protection Agency
Washington, DC 20460
Telephone: (703) 522-0249

# MUNICIPAL POLLUTION CONTROL PROGRAM AREA

## PROGRAM ELEMENT NO. 1BB033 – MUNICIPAL SEWERED DISCHARGES

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $156,000
Contracts: $205,000

Program Element Output: New or improved technology for the effective and economical control of pollution from municipal sewered discharges. Program efforts will be concentrated on full-scale demonstrations and evaluation of new treatment trains and systems. Technology for achieving high performance levels in removing organic materials, nutrients, and other pollutants so that municipal sectors will be able to achieve compliance with present and future water quality standards will be emphasized. Improved methods of operating both new and existing treatment works will be developed and demonstrated. Determination of cost effectiveness of treatment systems is an important function.

Program Element Director (PED):

Mr. John J. Convery
Advanced Waste Treatment Research Lab
National Environmental Research Center
Environmental Protection Agency
Cincinnati, OH 45268
Telephone: (513) 684–8232

**PROGRAM ELEMENT NO. 1BB033**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| PEMP-008 | Monitor Grant for Municipal Technology Reports (abstracts). | Research Grant | 104b | Rosenkranz |
| PEMP-009 | Prepare System for Municipal Technology Branch Planning and Program Development. | Contract | 105 | Rosenkranz |

**Research Objective Achievement Plan 21ASV: Demonstrate Combinations of Processes to Meet Water Quality Needs Technology**

Objective: Both new treatment trains and combinations of new unit processes with existing wastewater treatment plants capable of meeting any water quality standard and producing effluents suitable for any reuse application including potable reuse will be demonstrated. Results of specific demonstration projects will be published and disseminated. Firm recommendations regarding the applicability and cost effectiveness of the various AWT techniques and process trains in meeting effluent quality levels under any constraint will be developed. Final output will be in the form of final project reports and design manuals describing the application of the demonstrated technology.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ASV-017 | Demonstrate and evaluate nitrogen removal in a treatment train using breakpoint chlorination. | Demo Grant | 105 | Convery |

**Research Objective Achievement Plan 21ASW: Methods and Processes to Provide Improved Operation and Maintenance In-system Treatment and Treatment of Joint Municipal, and Industrial Waste**

Objective: ROAP output will include the demonstrated results and benefits of flow equalization and improving the capacity and operation of overloaded existing wastewater treatment plants. The applicability of equalization to relieve overloaded intercepter sewer systems, provide in-transit treatment, and eliminate septicity, will be demonstrated. Firm design criteria will be developed for each application. The feasibility of alternate in-sewer treatment techniques including aeration and chemical treatment will be determined for both new and existing collection systems. The most feasible method will be identified and demonstrated. The flow equalization ROAP and all programs developed for implementation shall be cooperative ORD-OAWP efforts.

**PROGRAM ELEMENT NO. 1BB033**
**Research Objective Achievement Plan 21ASW**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ASW-013 | Conduct two flow equalization studies, one study at an activated sludge plant with existing flow equilization basins, and the other upstream of a plant with existing basins in the sewage collection system. | Contract | 104b | Convery |
| 21ASW-014 | Prepare manual of practice documenting results of all known installations utilizing flow equalization for municipal wastewaters. (Funded by OA&WP) | Contract | 104b | Convery |
| 21ASW-016 | Establish performance baseline studies for activated sludge plants with current levels of staffing and operating procedures. | Contract | 104b | Convery |

## MUNICIPAL POLLUTION CONTROL PROGRAM AREA

### PROGRAM ELEMENT NO. 1BB034 – COMBINED SEWER OVERFLOWS AND STORM WATER DISCHARGES

Funds: Available as of November 3, 1973 for support of listed tasks:
Grants: $412,000
Contracts: $343,500

Program Element Output: New or improved methods of abating pollution caused by (1) discharge of untreated or inadequately treated waters from sewers which carry either storm water or both storm water and sewage, and (2) urban run-off not collected and carried in sewers to a point discharge. Program efforts will be to characterize the quality and pollution impact of these wastewaters and to develop methods (processes, hardware and techniques) for their control and treatment. Emphasis will be placed on advanced technology for full-scale plant systems and cost effectiveness of developed systems.

Program Element Director (PED):

Dr. Peter B. Lederman
Industrial Waste Treatment Research Lab
National Environmental Research Center
Environmental Protection Agency
Edison, NJ 08817
Telephone: (201) 548-3402

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| PEMP-008 | Contract assistance in planning and consolidating simulation modeling efforts | Contract | 105 | Rosenkranz |

## PROGRAM ELEMENT NO. 1BB034

**Research Objective Achievement Plan 21ASY: Treatment of Combined Sewer Overflows and Storm Water Discharges**

Objective: Effective and economically attainable combined sewer overflow (CSO) and storm water discharge (SWD) treatment, hardware and concepts evaluated and disseminated in research reports, plans, and specifications to provide performance, operating conditions, costs and design data compatible with the Storm Water Management Model (SWMM) and allowing establishment of sound planning and engineering decisions for Federal, state, municipal and regulatory/enforcement agency use. Also, provide guidelines and standards for Construction Grants Program for administering projects dealing with combined sewers.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ASY-127 | Demonstrate, evaluate, integrated system of physical chemical unit process combinations. | Demo Grant | 105 | Lederman |
| 21ASY-165 | Demonstrate dual use of treatment facilities for treatment of DWF and SWD's; also evaluate the use of coal fines on CSO treatment with an investigation centering principally on the use of the fines and the beneficial effect on sludge treatment (incineration). | Demo Grant | 105 | Lederman |

**PROGRAM ELEMENT NO. 1BB034**

**Research Objective Achievement Plan 21ASZ:** **Technology for Hydraulic and Pollutant Control of Urban Runoff**

Objective: A compilation, description, assessment and demonstration of techniques, materials and equipment for (1) identification of the extent, magnitude and impact of urban runoff; (2) in-system and off-system storage; (3) flow control, regulation and routing; (4) new and improved sewer construction materials and practices; (5) techniques for increasing the efficiency of collection and transport systems; (6) infiltration control; (7) runoff attenuation; (8) in-situ sewer repair; (9) methods for improved surface contaminant prevention/removal; (10) control/treatment to effect pollution abatement of wet-weather flow and dual wet and dry weather flow; and (11) beneficial use of stormwater. Final information would be in the form of working manuals, reports and quidelines compatible with the SWMM and would be made available to municipalities and sanitary authorities, local and state agencies, and construction and design engineers for incorporation into new construction, remedical work and improving operating practices. It would also be used as an information source for decision making in planning agencies, enforcement actions, land use determinations and river basin management. This ROAP responds to Section 105(a) (1) of WPCA Amendment of 1972.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ASZ-061 | Print and publish reports. | Contract | 105 | Lederman |
| 21ASZ-065 | Evaluate the impacts of seawater intrusion on municipal sewage treatment plants and recommend corrective measures. | Demo Grant | 105 | Lederman |
| 21ASZ-125 | Demonstrate and evaluate methods of improving flow in sewers by controlling and removing aquatic growths, vegetation and roots. | Contract | 105 | Lederman |
| 21ASZ-130 | Develop and demonstrate a two-point liquid level method of storm flow measurement. | Contract | 105 | Lederman |
| 21ASZ-183 | Develop and demonstrate helical flow regulator/solids-liquid separator | Demo Grant | 105 | Lederman |

## PROGRAM ELEMENT NO. 1BB034

**Research Objective Achievement Plan 21ATA:** **Simulation Models for Total Management of Sewage Systems**

Objective: Series of computer programs and documentation to include user's guide. Simplified models will be developed as planning aids. Verification will result in published evaluations of applied theory. A models management program for updating, user assistance, and dissemination. Further developments to enable prediction of more parameters and aspects regarding control modes. Models eventually utilized as basic tool for "urban intelligence systems" offering realtime computerized wet and dry-weather control of sewerage networks. Modeling extentions will be made to assist in basin planning needed for compliance with intent of Section 105(b) of the 1972 FWPC Act Amendment.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ATA-031 | Print & publish final reports. | Contract | 105 | Lederman |

**Research Objective Achievement Plan 21ATB:** **Methods, Processes, and Systems to Reduce Water Use and Total Sewage Flow**

Objective: The objective is to develop and/or evaluate methods, processes, and systems capable of achieving the maximum reduction of unnecessary municipal water consumption in order to reduce the size and cost of water, sewage and wastewater treatment services. The practicality of new approaches must be demonstrated to the satisfaction of regulatory agencies, design engineers, equipment manufacturers and home-owners. Successful development of new approaches will be in response to Sec. 104(o) (1) of the FWPCA Amendments of 1972.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ATB-003 | Perform comprehensive analysis of social, economic and technological factors related to reduction of municipal water use. Includes characterization of flow and composition from institutions and commercial establishments. | Contract | 104b | Convery |

**PROGRAM ELEMENT NO. 1BB034**
**Research Objective Achievement Plan 21ATB**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ATB-004 | Demonstrate vacuum toilet as a water flow reduction method. | Demo Grant | 104b | Convery |

**Research Objective Achievement Plan 21ATB: Methods, Processes, and Systems to Reduce Water Use and Total Sewage Flow**

Objective. A compilation, description and assessment of all new materials, techniques, and methods to detect and test sources of infiltration/inflow; minimize and eliminate infiltration/inflow; and system analysis of the infiltration/inflow problem. In addition, the infiltration/inflow abatement methods and design criteria for various conditions will be included. Preliminary results of such research and investigations will be made available before August 1973. Demonstration data for effectiveness and economics, using the newly developed materials, techniques and methods will be published from time to time.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ATB-025 | Joint Office of Research and Development/Office of Water Programs report to Congress on Flow Reduction. | Contract | 104b | Lederman |
| 21ATB-084 | Development of stepwise methodology/rapid methods for infiltration surveys. | Research Grant | 104b | Lederman |

## MUNICIPAL POLLUTION CONTROL PROGRAM AREA

### PROGRAM ELEMENT NO. 1BB035 – NON-SEWERED DOMESTIC WASTES

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $300,000
Contracts: **NONE**

Program Element Output: Demonstration of technology for the effective and economical control of pollution from non-sewered wastes so that municipal and rural sectors lacking conventional gravity collection systems will be able to upgrade their treatment capabilities to achieve compliance with present and future water quality standards. Program efforts will be to: (1) demonstrate flow reduction devices for the individual home; (2) develop and demonstrate improved home treatment systems; (3) examine economically feasible alternatives to existing septic tank systems; and (4) demonstrate intermediate systems between conventional sewers and individual systems.

Program Element Director (PED):

Mr. John J. Convery
Industrial Waste Treatment Research Lab
National Environmental Research Center
Environmental Protection Agency
Cincinnati, OH 45268
Telephone: (513) 684–8232

PROGRAM ELEMENT NO. 1BB035

**Research Objective Achievement Plan 21ATC:** **Research, Development, and Pilot Projects to Eliminate Pollution from Sewage in Rural or Other Areas Generating Small Flows**

Objective: Demonstration of new collection systems, e.g., pressure and vacuum sewers with their relative merits, costs, operating and design problems will be accomplished. A thorough study of the alternatives to septic tanks will be made and reported. Methods for upgrading package plants will be demonstrated along with evaluation and development of P-C package systems and ways of utilizing centralized facilities for multiple plants. Methods of regulation and control of I.H. treatment systems by municipalities, counties, districts, etc., will be demonstrated.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ATC-006 | Vacuum sewer demonstration. | Demo Grant | 105 | Convery |
| 21ATC-009 | Comprehensive study of individual home waste management. | Research Grant | 104 | Convery |

# MUNICIPAL POLLUTION CONTROL PROGRAM AREA

## PROGRAM ELEMENT NO. 1BB043 – TREATMENT PROCESS DEVELOPMENT AND OPTIMIZATION

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $253,000
Contracts: $611,000

Program Element Output: Process information for use in design of municipal and municipal-industrial wastewater treatment plants. Program efforts will be directed to: (1) develop new or improved technology for removal of pollutants; (2) develop charts and computer systems to facilitate design simulation and evaluation of individual treatment processes and systems of processes; (3) develop process control and instrumentation technology; and (4) develop new or improved methods for non-pollutional disposal of sludges and concentrated pollutants resulting from treatment processes. This effort will include major pilot plant work devoted to developing advanced treatment processes and trains. Full-scale demonstration of new unit processes is an integral part of this program. Determination of processes cost effectiveness is an important function.

Program Element Director (PED):

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## PROGRAM ELEMENT NO. 1BB043

### Research Objective Achievement Plan 21ASB: Wastewater Renovation and Reuse

Objective: 1) Full-scale demonstration of wastewater renovation for potable reuse 2) Determination of cost effective renovation technology for all non-potable reuse applications, i.e., irrigation, municipal, industrial, recreational and evaluation in existing installation#s; 3) Design manuals for all reuse applications covering engineering, economics, and reliability of most cost effective renovation technology.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ASB-002 | Construction of multipurpose 100,000 gpd reuse pilot plant. Processes included biological treatment, chemical coagulation, liquid solids separation, carbon adsorption, ozone oxidation, demineralization. | Contract | 104b | Convery |
| 21ASB-004 | Alteration of existing Advanced Waste Treamtment pilot plants to produce renovated waste-water by various flow sheets. Selection will be based on obtaining a feed of representative sewages. At least two sites will selected. | Demo Grant | 105 | Convery |
| 21ASB-018 | Economic analysis of water supply systems. | Contract | 104b | Convery |
| 21ASB-021 | Evaluation of municipal reuse plant performance. | Contract | 104b | Convery |

### Research Objective Achievement Plan 21ASC: Wastewater System Instrumentation and Automation

Objective: An adequate technical base to show the designer how all municipal wastewater treatment processes and entire plants can be controlled to maximize performance and/or reduce the cost of tratment. The technical base will take the form of design and cost information, process performance measurements with and without control, cost-effectiveness analyses, and full-scale demonstration of control loops in wastewater treatment plants.

**Research Objective Achievement Plan 21ASC**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ASC-404 | Demonstrate and provide all documentation necessary to operate a set of 6–8 treatment plants with computer assisted operating procedures. The semi-automatic control modes will include dissolved oxygen control, sludge blanket detectors to control return flow, computer assisted control of activated sludge wasting by sensing primary sludge blanket, control of anaerobic digesters, etc. | Demo Grant | 105 | Convery |

### Research Objective Achievement Plan 21ASD: Wastewater Sludge Processing and Treatment

Objective: Reports of full-scale demonstrations of reliable economical methods for treatment of sludges. Reports on pilot-scale and laboratory investigations of promising processes with recommendations regarding further work. Contributions to Technology Transfer Process Design Manuals and Construction Grant Guidelines. Technical papers and lectures on sludge treatment processes.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ASD-022 | Pilot plant scale study of chemical–sewage sludge thickening and dewatering. | Contract | 104b | Convery |

### Research Objective Achievement Plan 21ASE: Wastewater Treatment Sludge Disposal

Objective: Reports of full-scale demonstrations of reliable economical methods for disposal of sludges. Reports on pilot-scale and laboratory investigations of promising processes with recommendations regarding further work. Contributions to Technology Transfer Process Design Manuals and Construction Grant Guidelines. Technical papers and lectures on sludge disposal. Demonstrations of various methods of sludge disposal especially land spreading and soil injection of wet sludge with appropriate dissemination of information to the public.

**PROGRAM ELEMENT NO. 1BB043**
**Research Objective Achievement Plan 21ASE**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ASE-015 | Evaluation of complete wet oxidation. | Contract | 104b | Convery |
| 21ASE-016 | Sludge spreading on wooded land Seattle. | Demo Grant | 104b | Convery |
| 21ASE-018 | Evaluate sludge reformation. | Contract | 104b | Convery |
| 21ASE-019 | Critical evaluation of landfill disposal of sludge. | Contract | 104b | Convery |

**Research Objective Achievement Plan 21ASQ: Suspended and Colloidal Solids Removal from Municipal Wastewater**

Objective: The most promising methods of effluent suspended solids removal from ponds will be demonstrated. Other tertiary suspended solids removal methods will be studied and reported with emphasis on granular filters. Methods of improving SS removals within treatment plants will be demonstrated. New processes will be studied, and, in some cases, demonstrated. The most promising methods of suspended solids removal will be developed, studied and reported with emphasis on design parameters, operational needs, reliability and all other pertinent information.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ASQ-018 | Effluent filtration monitoring field sites. | Contract | 104b | Convery |

## PROGRAM ELEMENT NO. 1BB043

**Research Objective Achievement Plan 21ASR:** **Biological Treatment Process Improvements for Municipal Wastewater Applications**

Objective: Thorough assessment of all potentially attractive tehniques for upgrading conventional biological treatment processes and evaluation of the more attractive newer biological processes, both coupled with demonstrations of the more promising methods to provide water pollution control agencies and consulting engineers with the necessary performance characteristics, design guidelines, reliability factors and cost data to meet anticipated Best Practicable Waste Treatment Guidelines.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ASR-087 | Award grant to Village of Pewaukee, Wisconsin to evaluate applicability of upgrading its rotating biological contractor plant via chemical addition at several points. | Demo Grant | 105 | Convery |

# MUNICIPAL POLLUTION CONTROL PROGRAM AREA

## PROGRAM ELEMENT NO. 1BB044 – COLD CLIMATE WASTE TREATMENT

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: NONE
Contracts: $267,000

Program Element Output: Cold climate waste treatment systems. Program effort will be to develop processes and systems which will provide high levels of treatment compatible with the arctic environment. Criteria for treatment processes development will be established by investigating the tolerances of arctic aquatic species to various concentrations and forms of man-induced pollution.

Program Element Director (PED):

Mr. Richard W. Latimer
Arctic Environmental Research Lab
National Environmental Research Center
Environmental Protection Agency
College, AK 99702
Telehpone: (907) 479–2251

## PROGRAM ELEMENT NO. 1BB044

**Research Objective Achievement Plan 21ASF: Alaska Village Demonstration Projects**

Objective: Installation, operation, and evaluation of several facilities in various Alaskan villages in compliance with Section 113 of the FWPC Act Amendments of 1972. A report to Congress on the success of the project of the with recommendations for a State-wide program.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ASF-006 | Construction contract-third project. | Contract | 104b | Latimer |

**Research Objective Achievement Plan 21ASG: Treatment for Municipal Wastes in Cold Climates**

Objective: (1) Design criteria for aerated lagoons and extended aeration in cold climates. (2) Guidelines for disinfection of cold effluents. (3) Design criteria for physical-chemical treatment in cold climates. (4) Design criteria best practicalbe treatment in cold climates. (5) Design and demonstration of optimal system for achievement of no discharge and development of Alaskan communities.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ASG-006 | Prepare study of physical/chemical treatment in Arctic and Subarctic. | Contract | 104b | Latimer |

# MUNICIPAL POLLUTION CONTROL PROGRAM AREA

## PROGRAM ELEMENT NO. 1BB045 – WATER QUALITY CONTROL

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: NONE
Contracts: $130,000

Program Element Output: Technological approaches and techniques for pollution control other than conventional or advanced waste treatment of effluent streams. Program effort will be directed to develop new pollution control technology to utilize soils for the treatment of liquid wastes and sludges. Consideration will be given to other new nonconventional treatment systems. Program emphasis will placed on full-scale demonstration and evaluation, including system cost effectiveness.

Program Element Director:

Dr. William C. Galegar
Robert S. Keer Environmental Research Lab
Environmental Protection Agency
P.O.Box 1198
Ada, OK 74820
Telephone: (405) 332-8800

## PROGRAM ELEMENT NO. 1BB045

### Research Objective Achievement Plan 21ASH: Soil Systems for Municipal Wastewater Treatment

Objective: Research reports, demonstration facilities, and sound design methodology will be the major outputs. Research report data will be assimilated into mathematical expressions for predicting the capability of specific soil system designs to control nutrients, remove organics, etc. from municipal wastewaters. Upon completion of the ROAP, demonstration facilities designed from the mathematical expressions will show the reliability of predicted performance.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ASH-018 | Soil temperature mapping of U.S. to support selection of operational period for soil systems. | Contract | 104b | Galegar |

### Research Objective Achievement Plan 21ASN: Modular Integrated Utility Systems (MIUS)

Objective: Development, demonstration and evaluation of cost effective modular integrated utility systems (MIUS) with emphasis on integrated waste management facilities. Such integrated facilities will be designed and operated to produce revenues in excess of capital and operation and maintenance costs. A high degree of performance dependability will be provided. The output will be fully responsive to requirements of the FWPC Act Amendments of 1972. (Section 201(e) and 113).

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/FED |
|---|---|---|---|---|
| 21ASN-003 | Develop emission standards for MIUS for air pollutants, water pollutants, solid waste, noise. | Contract | 104b | Galegar |
| 21ASN-018 | Incorporate MIUS concepts into the Alaska Village Demonstration Project. | Contract | 104b | Galegar |
| 21ASN-025 | Develop cost vs emission level data for various levels of emission control, up to and including "zero discharge" for MIUS systems and compare to individual systems and regional conventional systems. | Contract | 104b | Galegar |

## INDUSTRIAL POLLUTION CONTROL PROGRAM AREA

The objectives within the Industrial Pollution Control Program Area are to develop and implement full-scale demonstrations and field evaluations of new or improved waste treatment or economical control processes and measures resulting from new knowledge developed through EPA and/or external research efforts on industrial manufacturing pollution abatement methods.

Program efforts will be directed toward demonstrating the best practicable, best available and zero pollution control technology with emphasis on water reuse and product-by-product recovery. The industries of concern are the manufacturing industries as defined by the SIC (Standard Industrial Classification) Major Group 19—39.

Program Area Manager (PAM):

Mr. William J. Lacy
Industrial Pollution Control Division
Office of Research and Development
Environmental Protection Agency
Waterside Mall
Washington, DC 20460
Telephone: (703) 522-0363

## INDUSTRIAL POLLUTION CONTROL PROGRAM AREA

### PROGRAM ELEMENT NO. 1BB036 - HEAVY INDUSTRIAL SOURCES

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $2,685,500
Contracts: $ 130,000

Program Element Output: New or improved methods for the abatement of water pollution caused by the discharge of wastes from heavy industries. These industries include, but are not limited to, metal and metal products, chemicals and allied products, nuclear and fossil fuel power production, petroleum and coal products, machinery and transportation equipment manufacturing, textile mill products, and rubber and plastic products, in addition to any joint industrial/municipal waste sources. Program effort will be directed to achieve, at minimum cost, the equivalent of 85 to 99% removal of contaminants and the technology to achieve closed-loop systems for water reuse. Emphasis will be placed on advanced technology full-scale plant systems.

Program Element Director (PED):

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**PROGRAM ELEMENT NO. 1BB036**
Program Element Director (PED):

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| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| PEMP-008 | Extramural support – Program stragety and policy planning. | Contract | 104 | Lacy |
| PEMP-009 | Extramural support assessment technology plan for significant primitive industries. | Contract | 104 | Lacy |

## PROGRAM ELEMENT NO. 1BB036

### Research Objective Achievement Plan 21AZN: Technology Research for the Elimination of the Discharge of Pollutants from the Steel, Machinery, Transportation, Equipment and Metal Finishing (Except Electroplating) Industries

Objective: Issue of periodic in-house reports on updated State-of-the-Arts for these industries. These reports will expand in detail on the pollution abatement problems within these industries and will identify special problem areas. Issue a series of technical reports on the engineering scale demonstrations of technically and economically viable methods for waste water multimedia pollution control for these industries.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AZN-013 | Pilot-scale demonstration to remove nitrates from fluoride lime-treatment effluents and to determine the feasibility of reusing fluoride lime treatment sludge and recovered water. | Demo Grant | 105 | Davies |
| 21AZN-015 | Characterization of water quality criteria necessary for process reuse within the carbon and Alloy Steel industries. | Contract | 105 | Davies |
| 21AZN-016 | Implementation of a semi-works demonstration of the combined (coking-smelting) benefication of iron ore to eliminate coking and balst furnace emissions (air and water) and improve iron recovery from ore while reducing ore tailings. | Demo Grant | 105 | Davies |
| 21AZN-017 | Printing and Publication of Research Reports. | Contract | 105 | Davies |

### Research Objective Achievement Plan 21AZO: Technology Research for the Elimination of the Discharge of Pollutants from the Non-ferrous Metals and Electroplating Industries

Objective: Comprehensive final reports covering (1) State-of-the-Art studies establishing the waste problems and abatement practices of the non-ferrous metals and metal finishing industries, and (2) projects involving the development and demonstration in actual plants of waste abatement technology which will achieve the objectives of the Federal Water Pollution Control Legislation.

**PROGRAM ELEMENT NO. 1BB036**
**Research Objective Achievement Plan 21AZO**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AZO-022 | Full scale demonstration of of the "acid retardation" process for recovering phosphoric acid from spent bright finishing solutions. | Demo Grant | 105 | Lederman |
| 21AZO-023 | Pilot plant study on the use of cementation for treating brass mill and metal finishing wastes. | Demo Grant | 105 | Lederman |
| 21AZO-025 | Pilot plant study on the precipitation of heavy metals from metal finishing wastes as sulfides. | Research Grant | 104b | Lederman |
| 21AZO-026 | Inplant demonstration study on the use of electrodialysis for for recovering chemicals from metal finishing rinse waters. | Demo Grant | 105 | Lederman |
| 21AZO-027 | Development of reverse osmosis membranes from previous study into comercially available configurations for use on high and low pH as well as oxidizing metal finishing wastes. | Research Grant | 104b | Lederman |
| 21AZO-028 | State-of-the-Art study to define the pollution problems and presently used and waste treatment technology of the engraving industry. | Research Grant | 104b | Lederman |
| 21AZO-029 | Bench scale study of an electrolytic technique for recovering metals at low concentrations from rinse waters. | Research Grant | 104b | Lederman |
| 21AZO-030 | Demonstration of ion exchange process for treating cyanide-bearing metal finishing rinse waters. | Demo Grant | 105 | Lederman |
| 21AZO-031 | Demonstration study on unique evaporative technique for concentrating phosphate-bearing rinse-waters from aluminum cleaning for marketing as fertilizer. Techniques would also have application for many other types of rinsewaters. | Demo Grant | 105 | Lederman |

## PROGRAM ELEMENT NO. 1BB036

**Research Objective Achievement Plan 21AZP:** **Technology Research for the Elimination of the Discharge of Pollutants from the Petrochemical and Petroleum Refinery Industries**

Objective: Develop participation within selected industrial plants for RD&D for treatment and control of wastewater and chemical wastes to achieve recycle, reuse, closed loop, taste, odor, and seafood tainting control; and for the optimization of biological treatment system efficiency within specific areas of the petroleum refining and petrochemical industrial regents. Grant and contract procedures will provide qualitative and quantitative reliability (quality control) of analytical data for use in reinforcing the reliability of program management decision making for all elements of EPA.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AZP-003 | Develop projects for petrochemical and petroleum refining industries to yield "real life" engineering and economic data on various phases of industrial waste treatment specifically oriented to product, by-product (solids, sludges, liquids and gases), chemical waste, waste water recycle-reuse, and minimum discharge to the environment. Optimize in-plant housekeeping and develop manual for optimization of in-plant housekeeping. Determine degree of purification of waste water necessary to maximize water recycle-reuse and closed loop systems in manufacturing cyclic organic intermediates including, but not limited to, the derivatives of benzene, toluene, anthracine, pyridine carbozole, and other cyclic chemical products. This task will provide specific methods and procedures for the successful design, engineering, and socio-economic analyses of industrial waste treatment and control. | Demo Grant | 105 | Galegar |

**PROGRAM ELEMENT NO. 1BB036**
**Research Objective Achievement Plan 21AZP**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AZP-004 | Develop studies to investigate and evaluate the removal of organic and inorganic contaminants from petroleum refining and organic chemical wastewater. Develop participation with industry and trade organizations for research, development, and demonstration projects to yield "real life" engineering design, and economic data on various phases of refinery waste treatment specifically oriented to product, by-product (solids, sludges, liquids, and gases), chemical waste, wastewater recycle-reuse, stormwater runoff, and minimum discharge to the environment. Determine degree of purification of wastewater necessary to maximize water recycle-reuse and closed loop systems by using full scale or pilot scale units. | Demo Grant | 105 | Galegar |
| 21AZP-011 | Accomplish task 003 for non-cyclic organic chemicals. | Demo Grant | 105 | Galegar |
| 21AZP-014 | Accomplish task 003 for chlorinated solvents. | Demo Grant | 105 | Galegar |
| 21AZP-021 | Accomplish task 003 for esters, amines, etc. of polyhydric alcohols, fatty and other acids, etc. | Demo Grant | 105 | Galegar |

## PROGRAM ELEMENT NO. 1BB036

**Research Objective Achievement Plan 21AZQ:** **Technology Research for the Elimination of Discharge of Pollutants from the Inorganic and Miscellaneous Chemicals Industries**

Objective: Reports containing State-of-the-Art technology; data on the development of new technology and its applicability; technical and economic data obtained on pilot and full scale demonstration units. Ultimate goal is to aid attainment of maximum recycle and minimum pollutant discharges to water and air, safe land disposal or recovery and reuse.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AZQ-014 | State-of-the-Art – Explosives Industry. | Research Grant | 104b | Lederman |
| 21AZQ-015 | Recovery of mineral acids from manufacturing processes. | Demo Grant | 105 | Lederman |

**Research Objective Achievement Plan 21AZR:** **Technology Research for the Elimination of the Discharge of Pollutants from the Agricultural Chemicals Industry**

Objective: Documentation of developed treatment process efficiency, design, and economics accompanied by verification of effluent environmental compatibility. Projects will be grouped to: (1) identify special problem effluents and attack those areas to meet legislative requirements; (2) provide a set of projects to leapfrog BPT and BAT levels into ZERO or TOT categories in response to the toxic/eutrophic nature of the wastes; and, (3) provide technology options at the BAT level suitable for transfer into allied industrial programs.

**PROGRAM ELEMENT NO. 1BB036**
**Research Objective Achievement Plan 21AZR**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AZR-013 | Initiate and complete full-scale demonstration of closed-loop chlorination conversion process for excess pesticides, their manufacturing intermediates and related organic analogs, e.g., chlorinated solvent/monomer still bottoms, PCB's, military agents, etc. Significant components include: (1) Publish Diamond Shamrock process variant bench scale results on 2, 4-D/2, 4, 5-T including EPA bioassay product safety verification re dioxin and herbicide destruction; (2) obtain private, other Federal Agency (e.g., NASA, DOD, USAF, USDA), or semi-public body (e.g., regional waste authority) monies to augment EPA funds for full scale unit; (3) Design/construct optimum storage and pretreatment facilities to handle mixed wastes; (4) Demonstrate process on stockpiles of waste feeds while conducting R&D studies to expand process usefulness to other industrial/military wastes; and, (5) complete evaluation of processes (or variants) for long term regional or national multi-industrial hazardous organic material disposal. | Demo Grant | 105 | Duttweiler |

**PROGRAM ELEMENT NO. 1BB036**
**Research Objective Achievement Plan 21AZR**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AZR-017 | Define and demonstrate at bench-pilot scale a process to effectively treat $NH_3$ plant condensate. Processes of interest include methane stripping with and without reboiler and selective ammonia adsorption followed by stripping. Key technical questions involve: (1) Ammonia carbonate equilibrium effects on column bottoms (discharge water) N content – what to do with bottoms water?; (2) Use of wet, ammoniated methane – can it be burned to make steam? What about corrosion and $NO_x$ emission? Can it be recycled to the reformer – if so what is the effect and ultimate disposition of the $NH_3$? Task addresses BPT-BAT technology for ammonia effluent control. | Demo Grant | 105 | Duttweiler |
| 21AZR-018 | Initiate and complete full scale demonstration of either the extraction and Friedel Grafts polymerization (degradation) process or the metal (bimetal couple) reductive process to meet BPT-BAT chlorinated pesticide treatment requirements. The extraction-degradation process has also been proposed for funding under the joint municipal-industrial ROAP as a full scale pesticide pretreatment process demonstration. Should "joint" funds be forthcoming, the metal reduction process will be demonstrated. | Demo Grant | 105 | Duttweiler |

**PROGRAM ELEMENT NO. 1BB036**

**Research Objective Achievement Plan 21AZT:** **Technology Research for the Elimination of the Discharge of Pollutants from the Textile Industry**

Objective: The output from this ROAP will consist primarily of extramural project reports that will document examples of the application of waste treatment/abatement technology for the textile industry (SIC 22 and 23). Successful technology research will advance the technical and economic State-of-the-Art for wastewater management in conformance with the technology levels that are mandated in PL 92-500. Administratively the ROAP activities includes assessment/evaluation, monitoring, and development of relevant projects which satisfy the EROS criteria.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AZT-007 | Extramural research project to investigate and coordinate dyeing system physical and chemical characteristics with available/potential control technology. | Research Grant | 104b | Duttweiler |
| 21AZT-008 | Extramural project to demonstrate the feasibility of membrane technology for recycle/reuse on inplant processing (dyeing) at multiple plant sites. | Demo Grant | 105 | Duttweiler |
| 21AZT-009 | Extramural project to demonstrate the reduction elimination of dye waste discharges using solvent dyeing systems. | Demo Grant | 105 | Duttweiler |

**Research Objective Achievement Plan 21AZV:** **Technology Research for the Elimination of the Discharge of Pollutants from Joint Publicly Owned Treatment Works**

Objective: Applied research, development, and demonstrations of technically and economically feasible methods of pollution control for the discharge of industrial wastes to publicly owned waste treatment systems. These activities will conclude with the presentation of detailed technical reports, seminars, design guidelines, and national standards of performance. These results will be used to establish guidelines on the degree and technology of needed pretreatment and to advance the State-of-the-Art for the elimination of the discharge of pollutants from publicly owned point sources discharges which have significant industrial waste components.

**PROGRAM ELEMENT NO. 1BB036**
**Research Objective Achievement Plan 21AZV**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AZV-014 | Characterize the effluent from existing joint treatment systems and evaluate the effect that various industrial waste have upon the effluent and treatment efficiencies. | Research Grant | 105 | Galegar |
| 21AZV-016 | Evaluate methods for the recovery of waste water material so as to eliminate their being discharged into joint type treatment systems. | Research Grant | 105 | Galegar |

## INDUSTRIAL POLLUTION CONTROL PROGRAM AREA

### PROGRAM ELEMENT NO. 1BB037 – FOOD, PAPER, AND OTHER INDUSTRIAL SOURCES

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $1,555,000
Contracts: $ 30,000

Program Element Output: New or improved methods for the abatement of water pollution coused by the discharge of wastes from a variety of "soft" industrial sources. These industries include, but are not limited to, paper and allied products, food and kindred products, stone, clay and glass products, in addition to other miscellaneous industrial sources. Program effort is being directed to achieve, at minimum cost, the equivalent of 85 to 99% removal of contaminants and the technology to achieve closed-loop systems for water reuse. Emphasis will be placed on advanced technology full-scale plant systems.

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# PROGRAM ELEMENT NO. 1BB037

**Research Objective Achievement Plan 21AZX: Industrial Multiple Level Control Wood Pulping**

Objective: The program will develop technology to answer the needs of PL 92-500 for advanced waste treatment and control involving ultimately, air, solid waste and waste effluent reuse and recycle systems. Pretreatment technology for municipal discharge will also be developed.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AZX-030 | Water quality requirements for kraft, NSCC, and sulfite pulping and and bleaching to establish recycle quality needed. | Contract | 105 | Jaworski |
| 21AZX-031 | Complete kraft pulping and bleaching recycle – using the Rapson Process or equivalent. | Demo Grant | 105 | Jaworski |
| 21AZX-032 | Complete sulfite pulping and bleaching recycle employing AWT technology. | Demo Grant | 105 | Jaworski |

**Research Objective Achievement Plan 21AZY: Industrial Multiple Level Control Paper and Paperboard**

Objective: Directed to the requirements of PL 92-500, program activities will provide reports of in-house and extramural projects answering the 1977–83–85 needs of the Act for staged advancing waste treatment and control technology involving, ultimately, total environmental control technology encompassing air, solid waste and waste effluent reuse and recycle systems for integrated and non-integrated paper and paperboard mills. Pretreatment technology for municipal treatment will also be developed.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AZY-012 | Removal of dyes and pigments from paper wastes. | Research Grant | 104b | Jaworski |
| 21AZY-013 | Water quality requirements for paper manufacturing. | Contract | 105 | Jaworski |

**PROGRAM ELEMENT NO. 1BB037**

**Research Objective Achievement Plan 21AZZ: Industrial Multiple Level Control Lumber and Wood Products**

Objective: Principal processes in the lumber and Wood Products Industry producing waste effluents derive from veneer and plywood production, hardboard, particleboard, insulation board and wood preservation. Directed to the requirements of PL 92-500, program activities will produce reports of in-house and extramural projects answering the 1977-83-85 needs of the Act. The OWP guideline document will provide indications of deficiencies to be satisfied.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AZZ-009 | Development of physical, chemical, and/or biological systems for treatment of wood preserving wastes involving creosote, pentachlorophenol, fire retardents, arsenic, chrome and copper containing wastes. | Demo Grant | 105 | Jaworski |

**Research Objective Achievement Plan 21BAA: Industrial Multiple Level Control Meat and Edible Oils**

Objective: Full scale demonstration projects, pilot scale development projects, and in-house feasibility studies to document and disseminate the technology needed to accomplish the five steps listed below and thereby provide the technical and economical feasibility of no discharge of pollutants and/or closed-loop systems.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21BAA-024 | In-plant reduction and characterization of wasteland from meat packing unit processes. | Demo Grant | 105 | Jaworski |
| 21BAA-025 | Solid paunch recovery and disposal or utilization in meat packing plants. | Demo Grant | 105 | Jaworski |

## PROGRAM ELEMENT NO. 1BB037

**Research Objective Achievement Plan 21BAB:** **Industrial Multiple Level Control: Fruits, Vegetables, Sugar and Bakery Products**

Objective: In general, it is felt that there are existing full scale waste treatments within the SIC 203 and 206 area that will meet the, to be issued, BPT and BAT levels. Thus, emphasis will be placed on developing ZERO and TOT technology for the canned and preserved fruit and vegetable industry (1972 SIC 203) and the raw cane sugar processing industry (portion of 1972 SIC 206). Final reports on these projects will be widely disseminated. Completion of the above will meet EROS objective for SIC 203 and a portion of EROS objective for SIC 205 (Bakery) and remainder of 206 (confectionary) will be met through technology transfer (no demonstration projects). Separate state-of-the-art reports, one for each SIC code, will be prepared delineating the alternatives and economics of closed loop systems after demonstrating ZERO technology. Upon demonstrating TOT technology separate EROS objective reports for each SIC code will be prepared.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21BAB-033 | Develop commercially competitive by-products from vegetable processing solid wastes (including waste activated sludge, etc.) | Demo Grant | 105 | Jaworski |
| 21BAB-034 | Demonstrate on a commercial scale low waste generation blanching operation of white potatoes. | Demo Grant | 105 | Jaworski |
| 21BAB-035 | Demonstrate on a commercial scale a low liquid waste vegetable blanching operation. | Demo Grant | 105 | Jaworski |
| 21BAB-036 | Develop and demonstrate a low water use cleaning process for washing leafy green vegetables. | Demo Grant | 105 | Jaworski |
| 21BAB-038 | Develop a low water use cleaning process that can be used in cleaning the majority of root crops. | Demo Grant | 105 | Jaworski |
| 21BAB-088 | Develop unit process water quality requirements for the beet sugar industry. | Research Grant | 104 | Jaworski |

## PROGRAM ELEMENT NO. 1BB037

**Research Objective Achievement Plan 21BAC:** **Industrial Multiple Level Control Grain Mills and Beverages**

Objective: Individual final reports will be issued and disseminated widely on each research and demonstration grant project. Upon completion of the EROS objectives, reports will be prepared for the grain milling and beverage food processing segments delineating the alternatives and associated economics of closed-loop processing.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21BAC-004 | Full-scale demonstration of treatment and reuse of liquid wastes from wine production. | Demo Grant | 105 | Jaworski |

**Research Objective Achievement Plan 21BAD:** **Industrial Multiple Level Control Dairy Products and Miscellaneous Foods**

Objective: Individual final reports will be issued and disseminated widely on each demonstration grant project. Upon completion of the EROS objectives, reports will be prepared for the dairy, seafood, and other miscellaneous food processing segments delineating the alternatives and associated economics of closed-loop processing.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21BAD-005 | Full-scale demonstration of dissolved-air flotation treatment of seafood processing waste (using LSA). | Demo Grant | 105 | Jaworski |
| 21BAD-008 | Full-scale demonstration of enzymatic column conversion of cheese whey to recoverable by-products. | Demo Grant | 105 | Jaworski |
| 21BAD-014 | Literature search on processing methods, water use practices, raw waste characteristics, methods of treatment, by-product recovery, etc., for this industrial segment, miscellaneous foods. | Demo Grant | 105 | Jaworski |

# INDUSTRIAL POLLUTION CONTROL PROGRAM AREA

## PROGRAM ELEMENT NO. 1BB392 – THERMAL POLLUTION TECHNOLOGY

Funds: Available as of November 3, 1973 for support of listed Tasks:

| | |
|---|---|
| Grants: | $64,000 |
| Contracts: | $94,000 |

Program Element Output: Technical information which will lead to more controlled means of dealing with waste heat from thermal power plants. Project efforts will lead to the development of advanced cooling techniques as well as the definition of beneficial uses for the waste heat, giving due regard to cost. Research and development data from field, laboratory and extramural studies will provide improved bases for developing and implementing thermal standards in addition to providing sites and engineering cost data on cooling techniques.

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## PROGRAM ELEMENT NO. 1BB392

**Research Objective Achievement Plan 21AZU: Industrial Water Control Technology: Electric Power Generation**

Objective: Critique of, and supplemental of S-O-A report to, (a) 270-day report to Congress (Sect. 104(t)) and (b) the two Industrial Waste Survey contract reports on control technology. Report and nomographs on engineering and economic feasibility of backfitting existing power plants with closed-cycle cooling. Engineering analysis and/or demonstration of cooling water treatments and combined systems for minimizing waste discharges to water, air and land. Demonstration of environmentally acceptable cooling water intake structures.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AZU-019 | Assess engineering and economic feasibility of backfitting the various cooling devices to existing power plants (Sect. 301 and 316). | Contract | 104b | Jaworski |
| 21AZU-021 | Pre-demonstration engineering and economic assessment of once-through discharge modifications for adverse impact control (Sect. 301, 306, and 316). | Contract | 104b | Jaworski |
| 21AZU-025 | Pre-demonstration characterization of $SO_2$ scrubber water potential handling and treatment (Sect. 306). | Research Grant | 104b | Jaworski |

## NON-POINT POLLUTION CONTROL PROGRAM AREA

The objectives within the Non-Point Pollution Control Program Area are to develop and implement full-scale demonstrations and field evaluations of new or improved waste treatment or economical control processes and measures resulting from new knowledge developed through EPA and/or external research efforts on:

(1) Agricultural activities including: forestry and logging operations; agricultural runoff; irrigation return flows; confined animal feeding; aquaculture and disposal of nonagricultural sludges on crop land. The development and demonstration mode will emphasize concepts which either maximize the potential for recycle or reuse (animal wastes, irrigation systems) or minimize adverse impact for "once through" systems (e.g., pesticide runoff). New and improved management concepts, fertilizer and pesticide formulations and application methods, and structural and equipment changes will be evaluated.

(2) Oil and hazardous material spills prevention, control and clean-up; the objective is to develop an array of countermeasures to contain spills, to prevent them from entering watercourses, and to control and remove those that reach waters to minimize damage to resources and to the water ecosystem. The variability of hazardous materials necessitates development of a wide range of countermeasures. Improved processes need to be developed to convert waste automobile oils to usable products to prevent dumping in watercourses. In addition, adequate methods must be developed to treat and control the discharge of wastes from the operation of vessels and recreational sources.

(3) Control of water pollution from mining operations and abandoned mining sites; the objective is to allow mining to be carried on in the future without causing environmental degradation.

(4) Control of water pollution from hydrological modifications such as construction, dredging, landfill and water resources development: these activities have the common environmental impact of causing substantial changes in the local or area hydrologic patterns.

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# NON-POINT POLLUTION CONTROL PROGRAM AREA

## PROGRAM ELEMENT NO. 1BB038 – TRANSPORTATION SOURCES

Funds: No extramural Tasks remaining which are planned for funding in the current Fiscal Year.

Program Element Output: Technology for the development of efficient and practical devices for the detection and prevention of pollution of the aquatic environment by watercraft (and other transportation sources) so as to enable industry to meet established standards. Program efforts will be concentrated on such pollutants as sanitary wastes, chemicals, oils, bilge waters, ballast waters, wash water and engine exhaust. This program will provide the necessary research to develop and evaluate prototype shipboard detection and anti-pollution devices, and prototype supporting onshore dockside facilities. This element also includes research and development of technology for control of pollution from recreational activities.

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## NON-POINT POLLUTION CONTROL PROGRAM AREA

### PROGRAM ELEMENT NO. 1BB039 – AGRICULTURAL SOURCES

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $557,000
Contracts: $155,000

Program Element Output: Methods and management practices for abatement and control of pollution from agricultural sources. These sources include, among others, silvacultural operations, agricultural and natural runoff, irrigation return flows, animal feedlot operations. Program efforts will include: (1) definition of the nature and extent of pollution from the various sources; (2) development of management models and improved agricultural practices to mitigate the pollution; and (3) development of criteria for promulgating specifications and guidelines for design and operation of control procedures. Where applicable, complete recycle technology will be developed.

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## PROGRAM ELEMENT NO. 1BB039

**Research Objective Achievement Plan 21AYN:** **Information and Guidelines for Management of Animal Wastes, Irrigation Return Flows, and Other Agriculture Related Non-Point Sources**

Objective: Develop mechanism for a comprehensive system of compiling and disseminating information regarding pollution abatement, control, and management of agricultural waste pollution sources (animal feedlots (AFL), and irrigation return flows (IRF) thru guidelines and conference proceedings for use by federal, state and private institutions and individuals.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AYN-015 | Comprehensive state-of-the-art of hog wastes and the treatment and/or disposal systems for said wastes. | Research Grant | 104b | Galegar |
| 21AYN-016 | Develop state-of-the-art report on present water law interpretations and their effects as constraints to more efficient water use and management, including recommendations for changes needed to encourage more efficient management of irrigation water resources. | Research Grant | 104b | Galegar |

**Research Objective Achievement Plan 21AYP:** **Formulation and Field Verification of Pesticide and Nutrient Runoff Mathematical Models**

Objective: Verified pesticide and plant nutrient mathematical models having river basin-wide predictive and simulative capability and nationwide applicability (exclusive of irrigated agricultural areas) for all pesticides and for the plant nutrients, nitrogen and phosphorus. The models will be used to formulate control methods to prevent pesticide and plant nutrient (N&P) pollution at the source.

## PROGRAM ELEMENT NO. 1BB039
## Research Objective Achievement Plan 21AYP

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AYP-026 | Develop and refine computer software programs to reduce pesticide residue data, hydrological and soil data and environmental monitoring data subsequent to analysis and as inputs into model testing. Develop software programs for each of the inhouse pesticide attenuation processes submodels. Using input data from the Piedmont and Great Lakes field sites, test and refine computer codes for the pesticide runoff and computer simulation model. | Contract | 104b | Duttweiler |
| 21AYP-027 | Apply linear and nonlinear multiple correlation analysis techniques to better isolate and define parameters affecting pesticide transport and attenuation processes. Information will be included in the transport and attenuation behavior submodels. | Contract | 104b | Duttweiler |
| 21AYP-030 | Revise the "lumped-parameter" and "mechanistically" oriented pesticide runoff models and integrate them into a watershed scale predictive and simulative model. | Contract | 104b | Duttweiler |
| 21AYP-036 | Field test and calibrate both the "lumped parameter" and semi-differential oriented pesticide models calibrated for Great Lakes Basin environmental conditions. The contribution of snow melt on pesticide loss will be assessed and modeled. | Research Grant | 104b | Duttweiler |

**Research Objective Achievement Plan 21AYR:** **Development and Demonstration of Improved Crop, Soil, Water Management Methods to Reduce the Volume and Pollutants in Irrigation Return Flows**

Objective: Final report from each task describing technology developed and/or demonstrated, management methods recommended, and guidelines for pollutant control from irrigated areas. Knowledge gained will form basis for regional conferences, seminars, and other published material such as manuals of recommended practices, guidelines, etc. to be utilized by federal and state agencies and other local institutions responsible for water quality protection.

## PROGRAM ELEMENT NO. 1BB039

### Research Objective Achievement Plan 21AYR

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AYR-019 | Effects of furrow, sprinkler, and subirrigation methods on potential pollution of groundwater by nitrate and other solutes utilizing enriched $N_{15}$. (Texas High Plains) | Demo Grant | 105 | Galegar |
| 21AYR-020 | Demonstrate on-farm water management practices related to irrigation and drainage which control the quantity and quality of IRF. (Colorado River Basin, Vernal, Utah). | Demo Grant | 105 | Galegar |

### Research Objective Achievement Plan 21AYV: Land Disposal, Treatment, and Control Concepts for Wastes from Certain Animal Feeding Enterprises

Objective: Research reports from all tasks to be used in the preparation of guidelines and design and operational manuals for EPA and the feeding industry. Findings will additionally be disseminated through waste management seminars, waste management manuals and similar publications.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AYV-015 | Develop uses for ash residue from processes. | Research Grant | 104b | Galegar |
| 21AYV-016 | Determine build up rates of DES and other growth promoters, antibiotics, salts, pesticides, etc. in soils and establish levels where subject substances become inimical to soil micro-organisms, animals, and aquatic life necessary for waste treatment. Develop/demonstrate management techniques for dust and odor control under various climatic conditions and from various facility designs. | Demo Grant | 105 | Galegar |
| | Demonstrate spray runoff treatment methods for central plains for beef cattle feedlot location in moderate rainfall area (30 inches). | Demo Grant | 105 | Galegar |

**PROGRAM ELEMENT NO. 1BB039**
**Research Objective Achievement Plan 21AYV**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AYV-018 | Demonstrate spray runoff for treatment of lagooned hog wastes in moderate rainfall area. | Demo Grant | 105 | Galegar |
| 21AYV-019 | Demonstrate land disposal of slurry wastes from both hog and cattle confinement operations, without odor, by injection below land surface. | Demo Grant | 105 | Galegar |
| 21AYV-026 | Demonstration in moderate rainfall of Central Great Plains the effects on land and land runoff of disposal of cattle and/or hog wastes which have received remedial/partial treatment. | Demo Grant | 105 | Galegar |
| 21AYV-027 | Develop user-oriented state-of-the-art for land disposal of treated and untreated animal wastes, delineating land loading criteria for major production areas, including mathematical runoff and infiltration modeling where available. | Contract | 104b | Galegar |

## NON-POINT POLLUTION CONTROL PROGRAM AREA

### PROGRAM ELEMENT NO. 1BB040 – MINING SOURCES

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $719,000
Contracts: $235,000

Program Element Output: Methods and management programs for the prevention, alleviation and abatement of water pollution caused by mineral extraction and mining activities. Program efforts will also be directed towards the development of new mining methods which will minimize environmental impact; this includes better preplanning and more effective mine closing techniques and other types of at-source control which will be applicable to both abandoned and active mines. Demonstration projects will be initiated to determine the engineering feasibility and the economic vectors associated with large scale treatment and at-source recommendations will provide a basis for development of planning and implementation programs as well as provide support to other Agency programs.

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## PROGRAM ELEMENT NO. 1BB040

### Research Objective Achievement Plan 21AFZ: Pollution Control Methods for Surface Mining

Objective: Procedures and techniques for preventing and reducing pollution discharges from surface mines and other surface properties. Pollution control manuals.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AFZ-003 | Geologic evaluation prior to mining. | Research Grant | 104b | Convery |
| 21AFZ-006 | Mine spoil potentials for soil and water quality – western mining. | Research Grant | 104b | Convery |
| 21AFZ-007 | Application of mine spoil evaluation techniques. | Research Grant | 104b | Convery |

### Research Objective Achievement Plan 21AGA: Control of Pollution from Underground Mining of Solid Fuels

Objective: ROAP output will be improved methods, processes and techniques for the control and prevention of the discharge of pollutants from active and abandoned mines. Reports will be prepared to disseminate the information to industry and control agencies.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AGA-029 | Evaluation of permeable limestone seals under various conditions. | Contract | 104b | Convery |

### Research Objective Achievement Plan 21AGB: New Mining Methods

Objective: Research and projects in several regions of the United States to illustrate new mining methods that reduce or prevent pollution resulting from mining. Demonstrations fro the benefit and adaptation of industry and control agencies.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AGB-005 | Long wall surface mining – Demonstration | Demo Grant | 105 | Convery |

**PROGRAM ELEMENT NO. 1BB040**
**Research Objective Achievement Plan 21AGB**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AGB-017 | Feasibility study of new mining techniques to reduce pollution due to erosion from surface mining. | Contract | 104b | Convery |
| 21AGB-019 | RFP – new mining techniques. | Contract | 104b | Convery |

**Research Objective Achievement Plan 21AGC: Mine Water Pollution Control Demonstrations – Section 107**

Objective: A series of projects will be undertaken to demonstrate the technical and economical feasible and practical techniques for controlling pollution from mining operations. These demonstrations will be made available to control agencies, industry, etc., to show how mine drainage can be controlled. Reports on each project will be made available to the public.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AGC-022 | Demonstration grant "Use of Sludge on Refuse Piles". | Demo Grant | 107 | Convery |
| 21AGC-051 | Update of information on available techniques for mine drainage control – abstracts. | Demo Grant | 107 | Convery |
| 21AGC-053 | Demonstration of an underground mine to prevent pollution formation during operation and post mining phase – Feasibility Study. | Contract | 107 | Convery |

## NON-POINT POLLUTION CONTROL PROGRAM AREA

### PROGRAM ELEMENT NO. 1BB041 – OIL AND HAZARDOUS MATERIALS SPILLS

Funds: Available as of November 3, 1973 for support of listed Tasks:

| | |
|---|---|
| Grants: | $ 252,000 |
| Contracts: | $1,522,000 |

Program Element Output: Technology for: (1) the prevention of oil and hazardous materials spills; (2) the emergency response and control of spills; and (3) the removal of spilled materials from the water environment following accidental spills. Emphasis will be directed toward spill prevention and control methods at industrial complexes, storage terminals, and spills which occur during transportation. Methods will be developed for remote and congested areas, warm and cold climates, and fresh and marine waters. Spill control, countermeasure and removal techniques, and methods for the recycling of waste oil will be demonstrated.

Program Element Director (PED):

Dr. Peter B. Lederman
Industrial Waste Treatment Research Lab
National Environmental Research Center
Environmental Protection Agency
Edison, NJ 08817
Telephone: (201) 548-3402

**PROGRAM ELEMENT NO. 1BB041**

**Research Objective Achievement Plan 21AVC: OHMSETT Support**

Objective: On-site supervision during construction of OHMSETT will ensure a usable facility. Installation of the necessary instrumentation, hardware and support equipment will provide a complete facility. Providing the resources for maintenance and operation will ensure that this facility functions efficiently and effectively.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AVC-005 | Engineering supervision of construction contractor. | Contract | 104b | Lederman |
| 21AVC-007 | Award construction contract change orders. | Contract | 104b | Lederman |
| 21AVC-010 | Purchase and install laboratory-shop -building. | Contract | 104b | Lederman |
| 21AVC-012 | Develop data processing software and obtain data processing contract. | Contract | 104b | Lederman |

**Research Objective Achievement Plan 21AVF: Chemical Identification of Oil Spills**

Objective: A series of analytical methods for laboratory use that furnish quantitation, characterization and identification of crude oils, waste oils, and refined products in water, sediments, and biological tissues. These methods will yield accurate results despite weathering, biodegradation, and the presence of similar natural organic materials.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AVF-004 | Develop a rapid chromatographic and spectrophotometric method for the quantitation and identification of oils in biological tissues. Sample handling and pretreatment techniques are included. | Research Grant | 104b | Lederman |

**PROGRAM ELEMENT NO. 1BB041**

**Research Objective Achievement Plan 21AVG: Oil Spill Containment Devices**

Objective: Full-scale containment device(s) which have been demonstrated to contain floating oil in currents with velocities ranging from 2 to 6 knots.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AVG-005 | Develop prototype containment units capable of controlling oil slicks on water with current velocities in the 4 to 6 knot range. | Contract | 104b | Lederman |

**Research Objective Achievement Plan 21AVH: Equipment for Physically Removing Oil Spilled in the Environment**

Objective: Demonstrate full-scale oil skimming equipment capable of operating on inland waters with currents between 2 and 6 knots. These devices will be easily deployed and transported, will withstand a wide range of environmental conditions and will be reasonably priced.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AVH-020 | Develop concept, build and demonstrate prototype, and build and demonstrate full-scale device for skimming oil from water under conditions of fast (above 4 knots) river currents. | Contract | 104b | Lederman |

**Research Objective Achievement Plan 21AVJ: Waste Oil Recycling**

Objective: Develop and demonstrate improved technology for reclaiming and recycling waste oils, including crankcase oil, slop oils, cutting oils and oily chemical wastes. Process flow diagrams for improved technology; new uses for waste oils with minimal processing. Management and collection techniques. A report to Congress as required by PL 92–500 on Waste Oil by the end of FY 1974.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AVJ-008 | Evaluate total waste oils impact and obtain material balance on nationwide basis. | Contract | 104b | Lederman |

**PROGRAM ELEMENT NO. 1BB041**
**Research Objective Achievement Plan 21AVJ**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AVJ-009 | Disposal of waste oil treatment bottoms (acid, caustic and clay sludges and raffinate). | Research Grant | 104b | Lederman |

**Research Objective Achievement Plan 21AVL: Prevention of Hazardous Material Spills**

Objective: Ready-to-use devices and reports on procedures and equipment for preventing spills of hazardous materials at production and usage sites, during transfer, at storage facilities, and during transport by rail, truck, etc. Particular attention will be paid to prevention of spills in municipalities; (1) with development of back-up systems to prevent entry into sewers or discharge into watercourses and (2) with decision of model local ordinance codes and contingency plans based on the inventory and use pattern of the hazardous materials. Procedures for assessing the stability of holding pond embankments will be developed. Recommendations will be made for preventing the spillage of heavy metal wastes from ore smelting and refining operations.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AVL-022 | Develop/demonstrate operational prototype field alarm devices to prevent impending spills of diked or lagooned hazardous materials. | Research Grant | 104b | Lederman |
| 21AVL-032 | Develop/demonstrate fail-safe devices for preventing spills of hazardous materials during on and off-loading operations. | Contract | 104b | Lederman |
| 21AVL-033 | Develop/demonstrate fail-safe devices for preventing spills of hazardous substances during spill-prone, high priority operations at plants, at storage and distribution terminals, and during transportation. | Contract | 104b | Lederman |

**Research Objective Achievement Plan 21AVM: Hazardous Material Spill Emergency Response**

Objective: Demonstrated field-usable devices and systems to be used for response in hazardous material spills, engineering drawings and specifications for their fabrication, manuals for their use, and reports detailing their development and evaluation. These will include spill alarm systems, field kits for detecting, identifying, and marking locations of spills, protective equipment for personnel safety and an integrated information system to assist response personnel in taking decisive countermeasures.

## PROGRAM ELEMENT NO. 1BB041

**Research Objective Achievement Plan 21AVM**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AVM-007 | Spill Alarm Systems – Determine the necessary components (in addition to those of task 03 and 04) for a total instream alarm system that will sense the broadest variety of spilled chemicals. Develop (if necessary) those components which are not commercially available but which are essential to the system. | Contract | 104b | Lederman |
| 21AVM-016 | Field Detection Kit – Survey the various commercially available portable field detection kits (including that developed under task 20); select those components most applicable to the broadest range of chemical spill situations; develop new components to supplement existing items, where necessary; and integrate selected components into an "all purpose" spill detector kit. Evaluate and demonstrate kit in field. | Research Grant | 104b | Lederman |

**Research Objective Achievement Plan 21AVN: Hazardous Material Spill Control and Removal**

Objective: Demonstrated full-scale devices and methods to control and remove spilled hazardous materials, engineering drawings and specifications for their fabrication ,manuals for their use, and reports detailing their development and evaluation. These will include back-pack devices to plug leaks and to foam-dike or gel spills on land, *in situ* treatment methods, rapidly transportable remote treatment systems, and readily deployable removal devices. This technology is needed to comply with provisions of Section 311 of PL-92-500.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AVN-005 | Water Spill Containment – Demonstrate modified "Sea Curtain" boom in a two-knot current. | Contract | 104b | Lederman |
| 21AVN-012 | Land Spill Containment – Design and fabricate prototype gelling agent dispenser. | Contract | 104b | Lederman |

**PROGRAM ELEMENT NO. 1BB041**
**Research Objective Achievement Plan 21AVN**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AVN-015 | Land Spill Containment – Optimize and fabricate a prototype "foam-like" dispensing system. | Contract | 104b | Lederman |
| 21AVN-022 | Leak Plugging – Demonstrate an operational, one-man operable, foam-in place, leak plugging device in spill situations. | Contract | 104b | Lederman |
| 21AVN-034 | Removal of Settled Spilled Hazardous Materials – Develop methods for removal of settled hazardous materials from large water bodies such as lakes, rivers, harbors, etc. | Contract | 104b | Lederman |
| 21AVN-055 | "In Situ" Spill Treatment – Demonstrate the use of carbon "tea bags" under field conditions in flowing streams and lakes. | Contract | 104b | Lederman |

**Research Objective Achievement Plan 21AVO: Separation and Recovery of Removed Spilled Hazardous Materials**

Objective: Operational systems/devices, reports, and manuals of procedures for: (1) the separation, recovery, and purification of spilled hazardous materials from the clean-up agents (carbon, resins, etc.) and any co-collected inert materials (mud, soil), (2) the safe and economical regeneration of the spent clean-up agents for re-use, and (3) the on-site detoxification/destruction of spilled hazardous materials and clean-up agents that cannot otherwise be salvaged or safely transported.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AVO-011 | Develop/demonstrate activated carbon regeneration systems with ultimate recovery of adsorbed hazardous material. | Contract | 104b | Lederman |

## PROGRAM ELEMENT NO. 1BB041

**Research Objective Achievement Plan 21AVR:** **Environmental Evaluation of Devices and Techniques to Control Hazardous Material Spills**

Objective: A captive field site (or sites) for evaluating on a significantly large scale, techniques and devices to detect, contain, control, treat, remove and dispose of spilled hazbardous materials. The site will be on government owned land, remote from any populated area and will contain a number of ponds and flowing watercourses separated by large areas of land. The water from these ponds and flowing watercourses will be capable of being contained and treated before being released from the site. The facility will contain areas where land spills can be made without endangering ground water. Reports detailing the survey, selection, and development of the site will be published.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AVR-004 | Site Survey – Conduct study to determine the suitability of a government-owned facility in the Northeast or Northwest United States as a captive site (of characterized ecology, climate, geography and hydrology) for the testing and evaluation of hazardous material spill prevention and control devices. | Research Grant | 104b | Lederman |

## NON-POINT POLLUTION CONTROL PROGRAM AREA

### PROGRAM ELEMENT NO. 1BB042 – HYDROLOGIC MODIFICATION

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $120,000
Contracts: See **RFP** when issued.

Program Element Output: Procedures for optimum design, construction, and operation of hydrologic modification projects which will minimize environmental impact. Physical changes of water courses for flood control, hydro-power, navigation, and irrigation; and local modifications of the water environment due to such things as dredging, construction, and landfill operations must be compatible with demands on our finite water resources for water supply, waste dilution, recreation, wildlife, and other beneficial uses. Research will include social, legal, and institutional aspects as well as those of a technical nature. Reports and recommendations will provide a basis for development of planning and implementation programs as well as provide support to other Agency programs.

Program Element Director (PED):

Dr. Tudor Davies
Grosse Ile Laboratory
Environmental Protection Agency
9311 Groh Road
Grosse Ile, MI 48138
Telephone: (313) 675-5000

## PROGRAM ELEMENT NO. 1BB042

**Research Objective Achievement Plan 21AGI:** **Control of Pollution Caused by Construction Projects**

Objective: Numerous projects demonstrating effective erosion and sediment control will be undertaken. A handbook on how to minimize environmental pollution from construction sites will be developed. The final output will be guidelines for the construction industry.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AGI-006 | Supplement demonstration project for an arid site. | Demo Grant | 104b | Davies |

**Research Objective Achievement Plan 21BBQ:** **Assessment of Non-Point Source Water Pollution Problems in the United States and Required Control Technology Programs**

Objective: A report giving an assessment of the type, nature, extent, distribution and variability of non-point sources as they effect water quality on a National scale including a comparison of these effects on water quality with other sources. A second report will be prepared which evaluates the cost and effectiveness of both existing and proposed systems and technology for control of non-point sources. A third report will define a recommended control technology program for EPA with defined research needs, objectives and a reasonable allocation of resources to meet these objectives.

**PROGRAM ELEMENT NO. 1BB042**
**Research Objective Achievement Plan 21BBQ**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21BBQ-001 | The principal objectives of this task include: (a) Non-Point problem assessment – prepare a report defining the type, nature, extent, and distribution of non-point sources as they effect water quality on a national scale including the relative impacts of these effects as compared to all other sources. (Report to be based on existing information in the files and reports of EPA and other sources.) (b) Non-Point Technology Assessment – prepare a report assessing the effectiveness and cost of available technology and systems for control of non-point sources including the definition of technology which is required to fill gaps in available systems and technology for control of non-point sources. (c) Control Technology Research Program – prepare a report defining and prioritizing technology Research Needs and objectives for non-point systems and control technology including a realistic and time phase plan for allocation resources to objectives. | Contract | 104b | Murphy |

# AIR POLLUTION CONTROL PROGRAM AREA

The primary objective of this program area is to assure the availability of control devices, processes, and approaches for control of air pollutants at their source. Programs range in scope from basic research and development activities through the design, construction, and operation of full-scale demonstration systems. Research, development, and demonstration programs are implemented principally through contracts with industrial firms and other governmental agencies. Approximately 10% of the research is conducted in in-house facilities. Portions of the more long-range and fundamental research and development activities are conducted through research grants with non-profit organizations, principally colleges and universities.

The air pollution control technology activities are currently grouped into four principal areas: (1) sulfur oxides, (2) nitrogen oxides, (3) particulates, and (4) hazardous and other pollutants.

A major portion of the program is devoted to research and development of technology for the control of sulfur oxide emissions. Historically, this research has focused on control of sulfur oxide emissions from electric power generating plants. More recently, increased attention is being given to the control of industrial combustion and industrial process sources.

Activity on nitrogen oxide control research is expanding rapidly to support control technology needs and regulatory requirements. The primary thrust of the ongoing nitrogen oxide research and development is in the area of combustion control. Increasing attention is being given to nitrogen oxide effluent treatment processes.

Particulate control research and development must cope with the needs for fine particulate control technology and improved and more economic conventional technologies. Reliable methods for measuring fine particulate as well as the development of high efficiency methods and equipment for controlling fine particulates in the 0.05 to 3.0 micron size range are being emphasized.

The hazardous and other pollutant control category embraces control technology for all air pollutants not classified within one of the above three categories. This includes the development of technology for control of hydrocarbons from stationary source, halides, and similar pollutants. Special emphasis is being placed on the control of hazardous and potentially hazardous pollutants including mercury, beryllium, asbestos, cadmium, vanadium, chromium, lead, etc.

Program Area Manager (PAM):

Mr. Richard E. Harrington
Air Pollution Control Division
Office of Research and Development
Environmental Protection Agency
Washington, DC 20460
Telephone: (202) 755-0658

# AIR POLLUTION CONTROL PROGRAM AREA

## PROGRAM ELEMENT NO. 1AB012 – PARTICULATE CONTROL

Funds: Available as of November 3, 1973 for support of listed Tasks:

| | |
|---|---|
| Grants: | $ 45,000 |
| Contracts: | $1,330,000 |

Program Element Output: Effective and practical processes and methods for the prevention or control of particulate air pollution. Program efforts will be to: (1) upgrade the principal present control techniques (including electrostatic precipitation, fabric filtration, and wet scrubbing) to satisfactory emission control levels; and (2) develop new technology to cope with fine particulate emissions. Modified and new devices will be tested at a pilot scale, and successful collection techniques will then be demonstrated at full scale on industrial emission streams.

Program Element Director (PED):

Dr. John Burchard
Control Systems Laboratory
National Environmental Research Center
Environmental Protection Agency
Research Triangle Park, NC 27711
Telephone: (919) 688-8146

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| PEMP-007 | Advisory service for coordination of the development output of the particulate control Program Element with other Federal and state agencies and with industry. | Contract | 104 | Harrington |

## PROGRAM ELEMENT NO. 1AB012

**Research Objective Achievement Plan 21ADJ:** **Conventional Effluent Treatment Technology (Particulates)**

Objective: Demonstration and comprehensive characterization of the particulate control capability and limitations of the best available full-scale, utility applications of Fabric Filters, electrostatic precipitators (ESP's), and scrubbers by means of thoroughly-planned and executed demonstration test programs to examine major variables for at least three test sites representing the best conventional technology for these three major control devices. Evaluation of the particulate control capabilities of a representative range of commercially available variations and types of the three major classes of conventional particulate equipment: fabric filters, ESP's and scrubbers on several major sources. These tests will produce fractional efficiency results under a fully-defined but limited range of operating conditions. Approximate number of source/equipment trials to be run include: Fabric filters, 10, scrubbers, 12; and ESP's, 12.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ADJ-037 | Determine the fractional efficiency of existing scrubbers on several major sources to validate performance curves of Scrubber Handbook. | Contract | 104 | Burchard |
| 21ADJ-038 | Determine the fractional efficiency of existing baghouses on several major sources. | Contract | 104 | Burchard |
| 21ADJ-090 | Test program to measure fractional efficiency of a baghouse for controlling emissions from coal-fired power boilers. Evaluate the effectiveness of fabric filtration schemes for collecting fine particulate (0.2 to 2 micron diameter) flyash emissions from pulverized coal-fired utility boilers, to assess the operating conditions under which their effectiveness is the most practicably feasible, and to estimate the economics of this approach. | Contract | 104 | Burchard |

## PROGRAM ELEMENT NO. 1AB012
## Research Objective Achievement Plan 21ADJ

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ADJ-091 | Test program to measure fractional efficiency of a high efficiency ESP for controlling emissions for a coal-fired utility boiler. Evaluate the effectiveness of the ESP installed on the Cat-Ox demonstration for the control of fine particulates (0.2 to 2 micron diameter) flyash emissions from a coal-fired utility boiler, assess the ESP operating conditions giving best control, and estimate the economics of this approach. | Contract | 104 | Burchard |
| 21ADJ-092 | Test program to measure fractional efficiency of scrubbers for controlling particulate emissions. Select one or more commercially installed scrubbers, determine effectiveness over the range of feasible operating conditions, and estimate economics of particulate control via scrubbers. | Contract | 104 | Burchard |

## Research Objective Achievement Plan 21ADK: Particulate Control Engineering Analysis

Objective: Current, comprehensive, and accurate engineering analysis of all particulate emission control techniques will result. These analyses will be in the form of individual evaluations of particulate processes and comparative analyses of all processes of a similar type. The evaluations will be made using common methodologies to facilitate comparisons. The comparative analyses will permit rational and timely management decisions based on solid, technical grounds; this will permit optimum allocation of resources within the air pollution control technology area.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ADK-026 | Process measurement services in support of engineering analysis activities. | Contract | 104 | Burchard |

## PROGRAM ELEMENT NO. 1AB012

**Research Objective Achievement Plan 21ADL: Fine Particulate Control Technology Development**

Objective: Development through pilot scale of at least three broadly applicable methods or devices for control of fine particle (less than 3.0 microns) emissions. Pilot scale demonstration of systems on several typical priority hazardous particle sources. Documentation of the relative technical and economic feasibilities of various systems. Development of at least one practical, manual particle-sizing method and one continuous method for fractional efficiency determination and control device performance evaluation.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ADL-002 | Develop and demonstrate fine particulate scrubber systems capable of collecting at least 90% of the particulate mass below 2 microns diameter. Scrubber systems will use flux forces, condensation and/or other promising mechanisms. Demonstrate best available scrubber technology as required by time schedule of demonstrations in the ROAPs in the hazardous and other pollutant program element. | Contract | 104 | Burchard |
| 21ADL-018 | Continuous Particulate Sizing. Select, test and continue to improve devices which will give continuous real time particle size in process streams for particulate from 0.2 to 5 microns. | Contract | 104 | Burchard |
| 21ADL-020 | Electrostatic capture of particles in fiber beds. Study a device for high efficiency collection of submicron-sized solid particulate matter from aerosols by electrostatic capture in fixed fiber beds composed of high dielectric material. | Research Grant | 104 | Burchard |

**PROGRAM ELEMENT NO. 1AB012**
**Research Objective Achievement Plan 21ADL**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ADL-025 | Develop and demonstrate improved fine particulate filter systems. Determine particle size fractional efficiency of filter systems as a function of filter medium, dust properties, and operating conditions, leading to pilot scale demonstration of reliable filtration systems for industrial sources requiring high efficiency control of very fine particulates and/or hazardous pollutants. Sources will be selected from ROAP's of the hazardous and other pollutant program element. | Contract | 104 | Burchard |
| 21ADL-028 | Provide devices with high stage capacities for collection of aerodynamically sized particulate in the 0.2 to 2 microns range to provide larger samples for physical, chemical and toxicological characterization studies. | Contract | 104 | Burchard |

**Research Objective Achievement Plan 21ADM: Effluent Treatment Technology Characterization (Particulate)**

Objective: This ROAP will result in the evaluation and documentation of the relative capabilities and limitations of particulate control devices. This information will permit selection and equipment users of collection systems that are technically and economically optimum for specific applications.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ADM-010 | Operation of Mobile Filter Unit. A highly versatile, mobile baghouse will be used to investigate the applicability of air filtration to the control of fine particulates emitted by a wide range of industrial sources. Selection of sources will be based on studies being carried out under all ROAP's of the hazardous and other pollutant program element. | Contract | 104 | Burchard |

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ADM-020 | Operation of a Portable Scrubber. Test the operation of a portable scrubber on a variety of industrial sources to obtain true operating data for efficiency and cost documentation for the control of specific fine pollutants. | Contract | 104 | Burchard |
| 21ADM-023 | Operation of Aerodynamic Test Facility (Dust Wind Tunnel). Perform research, development and evaluation studies of particulate control devices and measurement methods under standardized conditions. | Contract | 104 | Burchard |

# AIR POLLUTION CONTROL PROGRAM AREA

## PROGRAM ELEMENT NO. 1AB013 - $SO_x$ CONTROL

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: **NONE**
Contracts: $3,630,000

Program Element Output: Technology for the control of sulfur oxide emissions with technical and economic characteristics capable of providing levels of control necessary to meet ambient air quality and new source performance standards. The principle approaches will include flue gas treatment processes and fuel cleaning techniques. Control technology development and demonstration will address both the control of major point sources and smaller area sources. Primary attention will be given to regenerative processes since they offer technical and economic advantages for power generation, conserve natural resources and result in reduced waste products.

Program Element Director (PED):

Dr. John Burchard
Control Systems Laboratory
National Environmental Research Center
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Research Triangle Park, NC 27711
Telephone: (919) 688-8146

## PROGRAM ELEMENT NO. 1AB013

**Research Objective Achievement Plan 21ACX: Effluent Treatment Technology Development ($SO_x$)**

Objective: The ROAP output will include a report describing the process performance criteria for flue gas cleaning of area sources; the report will contain an assessment of the applicability of currently available processes to area sources. In addition, at least two processes will be developed through the pilot scale which are applicable to area sources. Modifications to processes available for point sources will be developed to extend their applicability by allowing alternative raw materials and products. A report will be issued for each process tested.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ACX-038 | Evaluate and develop the double alkali control process through bench scale, pilot plant and prototype testing. | Contract | 104 | Burchard |
| 21ACX-083 | Perform an industrial boiler engineering and cost study evaluating the effectiveness of flue gas cleaning as a means of $SO_x$ control. | Contract | 104 | Burchard |
| 21ACX-100 | Obtain, evaluate and disseminate technical and economic information about $SO_2$ control processes on commercial installations. | Contract | 104 | Burchard |
| 21ACX-103 | Conduct a comprehensive study and evaluation of treatment and disposal techniques for waste products from lime/limestone scrubbing processes; the investigation will include the evaluation of representative sorbent/fuel classes and treatment and disposal techniques for overall ecological/economic acceptability. | Contract | 104 | Burchard |
| 21ACX-104 | Gas Stream Characterization. To evaluate and develop techniques for continuous measurement of total volumetric gas flow in large scale industrial equipment. | Contract | 104 | Burchard |

**PROGRAM ELEMENT NO. 1AB013**

**Research Objective Achievement Plan 21ADB:** **Combustion Control Technology Development (SO$_x$)**

Objective: Sucessful operation of the 20–30 mega-watt demonstration plant should prove the viability of the fluidized-bed combustion concept for application in coal fired utility boilers having reduced power costs and emissions of SO$_x$, NO$_x$, and particulates at levels of 95%, 80% and 99%, respectively, below the levels which result from uncontrolled, conventional boilers.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ADB-016 | Provide analytical and engineering services for the combustion – SO$_x$ program. | Contract | 104 | Burchard |

**Research Objective Achievement Plan 21ADC:** **Industrial Process Control (SO$_x$)**

Objective: Reports will be developed which contain a technical and economic assessment of technology developed through the pilot stage for (1) the replacement of a kraft recovery furnace, (2) control of SO$_x$ from refineries, and (3) control of SO$_x$ from copper smelters. Data for scale up of the processes to commercial size will also be included in the reports. A model for petroleum refineries which will allow selection of optimum approaches for SO$_2$ control will be developed.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ADC-031 | Refinery Catalytic Cracker Regenerator SO$_x$ Control by Reduction with CO. (1) establish the useful catalyst life of the process; (2) establish design data for scale-up at optimum operating conditions as determined while feeding regenerator flue gases; (3) determine cost estimates for commerical scale units indicating capital and operating costs. | Contract | 104 | Burchard |

**PROGRAM ELEMENT NO. 1AB013**
**Research Objective Achievement Plan 21ADC**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ADC-059 | Sulfur Oxides Control Process Development for Copper Smelters. Initiate development of and bring to fruition a sulfur oxide control technology capable of reducing current emissions of existing copper smelters in excess of 96.5%. Other associated harmful emissions from copper smelters will also be considered. | Contract | 104 | Burchard |

**Research Objective Achievement Plan 21ADD: Clean Fuels Technology Development**

Objective: Effective SO$_x$ control methods resulting from environmentally sound processes for clean fuel production and from fuel gas desulfurization will be demonstrated. These processes include gasification/desulfurization of residual oil (CAFB); high temperature clean-up of gasification products; submerged combustion for producing clean, low-Btu gas from coal. These and other methods under development and evaluation can contribute to a control strategy applicable to industrial, commercial, and area sources.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ADD-022 | Development and potential demonstration of Consol FB limestone high temperature fuel gas cleanup system for $H_2S$. | Contract | 104 | Burchard |
| 21ADD-023 | Determine environmental impact of fossil fuel treatment/conversion processes. This study is to identify all effluents streams, estimate contaminants and available control techniques. Areas of specific control needs will be identified. | Contract | 104 | Burchard |
| 21ADD-024 | Determine pollutant fate during coal gasification in IGT Hygas Process. The objective of EPA support is to quantify pollutants and levels of pollutants in main process streams and especially in effluent streams. Study will provide specific data for additional inclusion in Task 23. | Contract | 104 | Burchard |

**PROGRAM ELEMENT NO. 1AB013**
**Research Objective Achievement Plan 21ADD**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ADD-027 | Perform a technical/economic investigation to identify economical, environmentally sound fuel gas cleanup systems. The development of low BTU fuel gas conversion processes could utilize either high or low temperature $H_2S$ removal systems. The environmental tal effects will be a major factor along with potential economics in future R&D needs. This study is to identify the advantages (or disadvantages) of these systems. | Contract | 104 | Burchard |
| 21ADD-036 | Systematic assessment of the application potential of clean fuels and of energy technology and recommendations of technology development project priorities. | Contract | 104 | Burchard |
| 21ADD-042 | Quick response technical and engineering support for fuel conversion and environmental evaulations. This support would be in the areas for process engineering support to identify or clarify specific problem areas, for providing additional design data that is required but outside scope of primary contracts, and for providing technical evaluations as to impact and applicability. | Contract | 104 | Burchard |
| 21ADD-046 | Development of data on applicability/use of Western coals in industrial and utility boilers. | Contract | 104 | Burchard |
| 21ADD-072 | Determination of trace elements in coal samples. The volatility of elements in coal is being determined. The volatility studies will aid in the determination of the fate of pollutants in pretreatment processes and upon combustion. | Contract | 104 | Burchard |

**PROGRAM ELEMENT NO. 1AB013**
**Research Objective Achievement Plan 21ADD**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ADD-105 | Demonstration of the CAFB atmospheric gasifier for generation of a clean fuel gas from residual oil for use in an existing (or new) combustor. | Contract | 104 | Burchard |
| 21ADD-106 | Provide analytical and engineering services to support clean fuels technology development. | Contract | 104 | Burchard |

**Research Objective Achievement Plan 21ADE: Sulfur Oxide Control Engineering Analysis**

Objective: Current, comprehensive and accurate engineering analysis of all $SO_x$ emission control techniques will result. These analyses will be in the form of individual evaluations of particular processes and comparative analyses of all processes of a similar type. The evaluations will be made using common methodologies to facilitate comparisons. The comparative analyses will permit rational and timely management decisions based on solid, technical grounds; this will permit optimum allocation of resources within the air pollution control technology area.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ADE-034 | Advanced Energy Study. Investigate feasibility of advanced energy concepts for nonpolluting solutions to the U.S. energy problem. | Contract | 104 | Burchard |
| 21ADE-037 | Provide contract support for technical analysis requested by outside groups through the quick-support provided by the multi-option contracts. | Contract | 104 | Burchard |

**Research Objective Achievement Plan 21AFJ: Coal Cleaning**

Objective: Demonstration of improved coal cleaning technology. Characterization of the cleanability of a major portion of U.S. coal by physical and chemical techniques and engineering applicability assessment of coal cleaning to meet present standards. Improved physical cleaning technology for time sized coal and pilot/prototype demonstration of chemical coal cleaning combined with mechanical coal cleaning. Maximum pollutant control will be achieved.

## PROGRAM ELEMENT NO. 1AB013

### Research Objective Achievement Plan 21AFJ

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AFJ-028 | Preparation of a technology transfer design manual for coal cleaning for use by OAWP, regulatory groups, and potential users of coal cleaning as a technique for meeting $SO_x$ standards. | Contract | 104 | Burchard |
| 21AFJ-040 | Development of low pressure coal hydrotreatment technology This task's objectives could involve continuation of technology feasibility testing, optimum materials handling schemes, and detailed quantification of process outputs. Areas of future potential will be defined. Technology integration with the Meyers Process would be a future technology assessment objective if sufficient funds were to be provided. | Contract | 104 | Burchard |
| 21AFJ-050 | Analytical support to coal cleaning program. Support to Research Branch. | Contract | 104 | Burchard |
| 21AFJ-051 | Quick response technical and engineering support for coal cleaning program. Objective is to provide for independent assessment of specific engineering data, provide for support in design areas and development of technical review on impact reports. | Contract | 104 | Burchard |

### Research Objective Achievement Plan 21AQQ: Municipal Refuse Combustion Technology

Objective: Determination of waste processing, combustion control and air pollution control equipment requirements in heat recovery systems which use wastes as an auxiliary or subsitute for fossil fuels.

**PROGRAM ELEMENT NO. 1AB013**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AQQ-011 | Applications study and evaluation of emission control potential:<br>(a) other utility boilers<br>(b) industrial boilers<br>(c) advanced technology. | Contract | 104 | Burchard |

**Research Objective Achievement Plan 21BAV: Emissions During Process Operating Changes**

Objective: Studies will be made to characterize various industrial emissions and to measure the performance of best current emissions control equipment, during process start-ups, shutdowns, upsets or major process changes (e.g., changes in feedstocks or products). Reports from these studies will help regulatory agencies to decide whether waivers from New Source Performance Standards should be allowed for these sources during periods of unsteady-state process operation. These studies will also identify any needs for development or demonstration work on emissions control systems.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21BAV-002 | Arrange for and conduct source sampling and characterization of selected air pollution sources. Characterize emissions from air pollution sources both equipped and not equipped with air pollution control equipment, processes or modifications. Special attention will be given to the characterization of sources during start-up, shut-down and periods of malfunction. Sources to be characterized will be selected on the basis of the need for data to support Agency regulatory and enforcement activities. | Contract | 104 | Burchard |
| 21BAV-003 | Conduct a study to determine and quantify the data base needs of the Agency to support Agency regulatory and enforcement activities. | Contract | 104 | Burchard |

# AIR POLLUTION CONTROL PROGRAM AREA

## PROGRAM ELEMENT NO. 1AB014 – $NO_x$ CONTROL

Funds: Available as of November 3, 1973 for support of listed tasks:

| | |
|---|---|
| Grants: | $ 95,000 |
| Contracts: | $290,000 |

Program Element Output: Effective and practical processes and methods for the prevention of $NO_x$ emissions from stationary sources by the modification of combustor design and combustion processes. The goal is to develop and demonstrate technology which will provide the capability of achieving 75% control of $NO_x$ emissions from major point sources.

Program Element Director (PED):

Dr. John Burchard
Control Systems Laboratory
National Environmental Research Center
Environmental Protection Agency
Research Triangle Park, NC 27711
Telephone: (919) 688-8146

## PROGRAM ELEMENT NO. 1AB014

**Research Objective Achievement Plan 21ADG: Combustion Control Technology Development ($NO_x$)**

Objective: The state-of-the-art in combustion control of $NO_x$ and combustible emissions from commercial systems will be established through field testing and surveys. Fundamental studies will provide information on pollutant formation and control for EPA combustion activities. Combustion control technology will be identified and developed through experimental studies of combustion. The more promising techniques will be applied to commercial prototypes to generate design manuals and operating guides which industry can use to control combustion related pollutants.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ADG-021 | Effect of changes in stable flame zone species concentrations on pollutant emissions (Arizona). (1) Determine the effect of marked changes in flame zone specie concentrations on pollutant emissions, where these changes are induced either by changes in fuel characteristics (e.g., producer gas, or low sulfur oil) or by other chemical perturbations of the flame; and (2) establish working correlation and exercise existing modeling tools to relate specie concentrations, kinetics, flame characteristics and furnace variables to pollutant emissions. | Research Grant | 104 | Burchard |
| 21ADG-056 | Provide analytical and engineering design and survey service required to support combustion control technology development ($NO_x$). | Contract | 104 | Burchard |
| 21ADG-063 | System design criteria for non-polluting catalytic combustors of potential use in both stationary point and area sources. To develop a low temperature, catalytic combustion unit for natural and synthetic fuels which does not produce $NO_x$, CO or carcenogenic hydrocarbon or fine particulate emissions with potential use in both point and area sources. | Contract | 104 | Burchard |

## PROGRAM ELEMENT NO. 1AB014

### Research Objective Achievement Plan 21ADG

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ADG-064 | Chemical reactions and kinetics of soot and related pollutant formation and control during combustion of fuels. Establish the mechanisms of formation of soot and related pollutants in flames, to determine combustion characteristics which will prevent formation of these pollutants and to establish the mechanism of destruction of the pollutants once they are formed. | Research Grant | 104 | Burchard |

### Research Objective Achievement Plan 21ADH: Demonstration of $NO_x$ Control Using Molecular Sieves

Objective: The molecular sieve nitric acid control technology will be demonstrated in a form which is applicable to new and existing Ammonia Oxidation Process (AOP) nitric acid plant industry sources by 1975. Products of the demonstration will include but not be limited to: (1) engineering analysis of the demonstration results; (2) process specification manual including process drawings; (3) an operating and test data journal.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ADH-005 | Source sampling and evaluation of an industry-installed molecular sieve system (different than task 02) at a nitric acid plant to demonstrate reduction of $NO_x$ emissions to less than 50 *ppm*/hr. | Contract | 104 | Burchard |
| 21ADH-006 | Source sampling and evaluation of an industry-installed molecular sieve system at a sulfuric acid plant to demonstrate reduction of $SO_x$ emissions to less than 100 *ppm*/hr. | Contract | 104 | Burchard |
| 21ADH-007 | Source sampling and evaluation of an industry-installed molecular sieve system at a chlorine plant to demonstrate the reduction of mercury emissions to less than 30 *ppm*/hr. | Contract | 104 | Burchard |

**PROGRAM ELEMENT NO. 1AB014**
**Research Objective Achievement Plan 21ADH**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ADH-008 | Independent engineering analysis of molecular sieve process manual information and sampling data conclusions generated by process offeror and host company for tasks 05, 06, and 07 above. | Contract | 104 | Burchard |

**Research Objective Achievement Plan 21ADI: Nitrogen Oxide Control Engineering Analysis**

Objective: Current, comprehensive and accurate engineering analysis of all $NO_x$ emission control techniques will result. These analyses will be in the form of individual evaluations of particular processes and comparative analyses of all processes of a similar type. The evaluations will be made using common methodologies to facilitate comparisons. The comparative analyses will permit rational and timely management decisions based on solid technical grounds; this will permit optimum allocation of resources within the air pollution control technology area.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ADI-019 | Provide mechanism for general statistical, modeling, and computer services to Control Systems Laboratory (CSL) to insure completeness, representativeness and economy of data gathering for all CSL test experimental programs. | Contract | 104 | Burchard |

## AIR POLLUTION CONTROL PROGRAM AREA

### PROGRAM ELEMENT NO. 1AB015 – CONTROL TECHNOLOGY – OTHER POLLUTANTS

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: **NONE**
Contracts: $2,100,000

Program Element Output: Control technology for air pollutants such as hydrocarbons, halides, carcinogens, carbon monoxides, hazardous and other pollutants which are deemed to be significant and require source and area control. Development and demonstration of control technology for odors, products of incineration, and hazardous and other pollutants from industries including graphic arts, phosphate rock, organic chemicals, glass and ceramics, aluminum, paint and varnish, petrochemicals, electrochemicals, food and other miscellaneous industries will be undertaken.

Program Element Director (PED):

Dr. John Burchard
Control Systems Laboratory
National Environmental Research Center
Environmental Protection Agency
Research Triangle Park, NC 27711
Telephone: (919) 688-8146

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| PEMP-017 | Advisory service for coordination of the development output of the hazardous P.E. with Federal and state agencies and with industry. | Contract | 104 | Harrington |

## PROGRAM ELEMENT NO. 1AB015

### Research Objective Achievement Plan 21AFA: Control of Specific Hazardous Pollutants

Objective: Execution of this Research Objective Achievement Plan will result in control technology to eliminate visible emissions from currently unenclosed sources of asbestos, to reduce the emissions from enclosed sources of asbestos, and to reduce the emissions of hazardous metals from other sources by a factor of 5 to 10 as cited in the Environmental Research Objective Statement The work outlined in the Research Objective Achievement Plan approach is a minimum program having maximum probable benefits for public health and welfare.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AFA-004 | Control of asbestos emissions from mine faces, dumps, and storage areas. Demonstrate control technology for non-encloseable sources of asbestos. This task will be directed to an evaluation of environmental engineering controls for asbestos emissions from open sources in the vicinity of mines and mills, where the provisions of the health and safety regulations as implemented by the Bureau of Mines (30 CFR 55.5) and by the Occupational Safety and Health Administration (20 CFR 1910.93A) may prove inadequate to protect the public or others who may be affected due to the lack of demonstrated technology. | Contract | 104 | Burchard |

**PROGRAM ELEMENT NO. 1AB015**
**Research Objective Achievement Plan 21AFA**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AFA-006 | Demonstrate improved control technology for enclosed sources of asbestos. The first phase will determine the fractional efficiency of particulate removal by wet collectors and other devices for comparison to determined efficiency of fabric filters to provide necessary background information to asbestos equipment standard (40 CFR 61.23b and c). The second phase will demonstrate any major reduction in asbestos emissions if so indicated by the first phase. | Contract | 104 | Burchard |
| 21AFA-011 | Improved measurement techniques for asbestos in process streams. Evaluate procedures for sampling and analysis of asbestos in process streams and control equipment. Develop improved methods where necessary and feasible. | Contract | 104 | Burchard |
| 21AFA-025 | Identify and develop the most promising concept for removal of mercury from $SO_2$ containing waste gases into a suitable process for pilot plant studies. | Contract | 104 | Burchard |

**Research Objective Achievement Plan 21AFH: Hazardous and Other Pollutant Control Engineering Analysis**

Objective: Current, comprehensive, and accurate engineering analyses of all Hazardous and Other Pollutants emission control techniques will result. These analyses will be in the form of individual evaluations of particular processes and comparative analysis of all processes of a similar type. The evaluation will be made using common methodologies to facilitate comparisons. The comparative analyses will permit rational and timely management decisions based on solid, technical grounds; this will lead to optimization in the allocation of resources within the air pollution control technology area.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AFH-016 | Identification of new demonstration opportunities (Emerging Technology). | Contract | 104 | Burchard |

## PROGRAM ELEMENT NO. 1AB015

### Research Objective Achievement Plan 21AFH

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AFH-020 | Provide engineers support services for the evaluation and review of hazardous and other pollutants programs, projects, and processes. | Contract | 104 | Burchard |
| 21AFH-021 | To develop methodologies for collecting, organizing, and evaluating data on potentially hazardous pollutants for use in control systems development programs. | Contract | 104 | Burchard |
| 21AFH-023 | Provide statistical review of all CSL test/experimental programs (This task and task 24 implement through the same contract but with funding from different sources. This task is funded from the engineering analysis ROAPs. | Contract | 104 | Burchard |

### Research Objective Achievement Plan 21AQR: Iron and Steel Industrial Process Control Development

Objective: Iron and steel industrial process emission controls will be developed to the point at which the decision to demonstrate can be made. Specific products will include (1) engineering analysis of all technology development results; (2) technology specifications and drawings; (3) a journal of all operating and test data collected; and (4) recommendations for further work.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AQR-005 | Demonstrate and optimize, on a co-funded basis, the Sinter Plant Gas Recycle System to minimize emission of all air pollutants ($SO_2$, particulates, hydrocarbons, CO, fluorides, etc). At completion of demonstration decision will be made to determine whether additional add-on gas cleaning is required. | Contract | 104 | Burchard |

## PROGRAM ELEMENT NO. 1AB015
**Research Objective Achievement Plan 21AQR**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AQR-042 | Provide statistical support as needed for all iron and steel tasks to optimize establishment and execution of experimental program. | Contract | 104 | Burchard |

### Research Objective Achievement Plan 21AUY: Control Technology for Industrial Operation – Hazardous

Objective: Control technology adequate to establish NSPS or meet Ambient Air Quality Standards will be identified or developed. Emission data required by Standards and Enforcement will be generated. Thorough evaluation of alternative technology will promote the utilization of the most economically and technically favorable control methods.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AUY-010 | Ferro-alloy furnace toxic emission control. Physically, chemically, and toxicologically characterize the toxic pollutant emissions from ferro-alloy manufacture. | Contract | 104 | Burchard |
| 21AUY-011 | Ferro-alloy furnace controls development. Develop technology to achieve 80–90% reduction of manganese emissions and demonstrate at a large pilot scale. | Contract | 104 | Burchard |
| 21AUY-040 | Toxic pollution evaluation for primary copper smelters. Physically, chemically and toxicologically characterize the toxic pollutant emissions from a copper smelter through literature, field and engineering studies. | Contract | 104 | Burchard |
| 21AUY-041 | Toxic pollution control from primary copper smelters. Demonstrate an 80–90% reduction in potentially hazardous emissions from a copper smelter at a large scale pilot plant. | Contract | 104 | Burchard |

**PROGRAM ELEMENT NO. 1AB015**
**Research Objective Achievement Plan 21AUY**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AUY-044 | Process measurements for primary metals industries. Develop improved procedures for measuring process streams in the ferrous and non-ferrous metals industry. | Contract | 104 | Burchard |

## Research Objective Achievement Plan 21AUZ: Control of Hazardous Pollution from Combustion Processes

Objective: Emission standard for the hazardous pollutants discussed in this ROAP will be based on health effects studies. Based on present knowledge, these standards will probably require very high removal efficiencies of control devices. The output of this ROAP is aimed at reducing combustion source emissions of hazardous materials such as V, Be, Ni, Cr, Se, HG, B, Ba, POM, As, Cd, Cu, F, Pb, Mn, Sn and Zn by a factor of 5–10 compatible with the combustion sources of importance. Work to be conducted under this ROAP will provide the design basis for demonstrations of control devices which will be capable of achieving the required levels of control.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AUZ-002 | Field testing of selected combustion sources for hazardous pollutants. Determine the physical, chemical and toxicological properties of potentially hazardous pollutant emissions (including inorganics and POM) from selected coal-fired and oil-fired power boilers, industrial boilers, commercial and residential boilers, incinerators, and industrial kilns and neat sources to help define the requirements and specifications for control systems or devices. | Contract | 104 | Burchard |

**PROGRAM ELEMENT NO. 1AB015**
**Research Objective Achievement Plan 21AUZ**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AUZ-004 | Develop sampling and analytical techniques for process studies. Select, evaluate and modify, as necessary, methods for sampling gas streams of unknown composition, for collection of fine particulate fractions, and for qualitatively and quantitatively determining the elemental composition and chemical forms of POM as well as inorganics as required to provide data of the quality needed for process evaluation and toxicology testing. | Contract | 104 | Burchard |

**Research Objective Achievement Plan 21AXM: Carcinogenic and Other Organic Pollutant Control**

Objective: The significant outputs of this ROAP will be: (a) Improved control technology for enhancing the quality of the atmosphere and for meeting anticipated standards to reduce the level of carcinogenic and organic pollutants in urban areas; (b) Design data for control equipment needs; (c) Recommendations for the demonstration of control technology and the implementation of standards; (d) Reports on the completed studies.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AXM-020 | Toxic pollution control of Ethylene Dichloride. Develop technology which will provide the capability for greater than 99% control of Ethylene Dichloride from manufacturing plants. | Contract | 104 | Burchard |
| 21AXM-030 | Acrylonitrile manufacture toxic emission control. Reduce potentially hazardous emissions from acrylonitrile manufacturing plants by 80%. | Contract | 104 | Burchard |

# DATA AND INFORMATION RESEARCH PROGRAM AREA

The Data and Information Research Program Area is responsible for planning, coordinating, establishing, reviewing and assessing research, development and appropriate demonstration programs aimed at the establishment of effective research information and data systems, including multimedia or multi-pollutant data analysis and special data handling and processing studies.

Program Area Manager (PAM):

Mr. H. Matthew Bills
Data and Information Research Division
Office of Research and Development
Environmental Protection Agency
Waterside Mall
Washington, DC 20460
Telephone: (202) 755-0635

# DATA AND INFORMATION RESEARCH PROGRAM AREA

## PROGRAM ELEMENT NO. 1BA029 – LAKE SURVEY

Funds: No extramural Tasks remaining which are planned for funding
in the current Fiscal Year.

Program Element Output: Identification of those lakes and other impounded bodies of water which receive effluent discharges from municipal sewage treatment plants. Samples will be collected from among these selected lakes for an evaluation of the response of the receiving water to reduction in phosphorus discharge from treatment plants.

Program Element Director (PED):

Dr. Donald Wruble
Monitoring Operations Division
Environmental Protection Agency
P.O. Box 15027
Las Vegas, NV 89114
Telephone: (702) 736–2969

Dr. Norbert A. Jaworski
Pacific Northwest Environmental Research Lab
National Enviornmental Research Center
200 S.W. 35th Street
Corvallis, OR 97330
Telephone: (503) 752–4211

## DATA AND INFORMATION RESEARCH PROGRAM AREA

### PROGRAM ELEMENT NO. 1HA325 – DATA AND INFORMATION RESEARCH

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: **NONE**
Contracts: $175,000

Program Element Output: Planning, coordinating, establishing, reviewing, and assessing research, development, and appropriate demonstration programs aimed at the establishment of effective research information and data systems, including multi-media or multi-pollutant data analysis and special data handling and processing studies.

Program Element Director (PED):

Dr. S. David Shearer
Quality Assurance & Environmental
Monitoring Laboratory
National Environmental Research Center
Environmental Protection Agency
Research Triangle Park, NC 27711
Telephone: (919) 549-8411

Mr. George Morgan
Monitoring Systems Research & Development Lab
National Environmental Research Center
Environmental Protection Agency
P. O. Box 15027
Las Vegas, NV 89114
Telephone: (702) 736-2969

## PROGRAM ELEMENT NO. 1HA325

**Research Objective Achievement Plan 22ABE:** **Monitoring Network Optimization Guides Development**

Objective: Model plan will be published for developing monitoring systems for small and medium municipalities which can be used to maximize the benefit/cost ratio for monitoring operations of various types, such as trend assessment, compliance, etc. This will include a minimum personnel organization, a training and certifying program and minimum laboratory and support facilities.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 22ABE-004 | Contract for urban studies of air networks to develop optimum design. | Contract | Mixed | Shearer |
| 22ABE-005 | Contract for urban studies of water networks to develop optimum design. | Contract | Mixed | Shearer |
| 22ABE-007 | Contract for design of management procedures for network operation; including manpower, training and certification. | Contract | Mixed | Shearer |

## EQUIPMENT AND TECHNIQUES PROGRAM AREA

The principal objective of research conducted or supported within the Equipment and Techniques Program Area is to develop methods and instrumentation for the detection, identification, and quantification of pollutants in all media at the lowest significant concentration. This research is necessary to provide measurements on the causes, extent, effects and control of pollution and to assist in the setting of standards and determining compliance with standards.

Thus, the Equipment and Techniques Area is directed towards the development of instrumentation and methods for the detection and quantitative identification of chemical and biological pollutants in air and water, toxic residues in plant and animal tissues and physical pollutants such as heat, radiation and noise in the environment. State-of-the-art reviews, prototype instrumentation development, and pioneering research studies related to the development of new or significantly improved analytical methods or instrumentation are supported.

Program Area Manager (PAM):

Dr. Henry F. Enos
Equipment and Techniques Division
Office of Research and Development
Environmental Protection Agency
Waterside Mall
Washington, DC 20460
Telephone: (703) 755-0646

# EQUIPMENT AND TECHNIQUES PROGRAM AREA

## PROGRAM ELEMENT NO. 1AA010 – INSTRUMENTATION AND ANALYTICAL METHODS DEVELOPMENT

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $ 173,000
Contracts: $1,321,400

Program Element Output: Measurement methods, both manual and instrumental, required to support Federal, State and local programs for ambient air quality and source emission measurements. Program efforts will be to develop and recommend methods to the standardization program for ultimate adoption and promulgation as EPA approved methods. This program consists of research, development, testing and evaluation activities and covers all needs for measurement methodology of the air pollution control programs including measurement techniques for all classes of pollutants and pollution sources, mobile and stationary.

Program Element Director (PED):

Dr. Paul Altshuller
Chemistry & Physics Laboratory
National Environmental Research Center
Environmental Protection Agency
Research Triangle Park, NC 27711
Telephone: (919) 549-8411

Mr George Morgan
Monitoring Systems Research & Development Lab
National Environmental Research Center
Environmental Protection Agency
P.O. Box 15027
Las Vegas, NV 89114
Telephone: (702) 736-2969

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| PEMP-011 | Conduct National meeting on Air Instrumentation. | Research Grant | 103 | Enos |

## PROGRAM ELEMENT NO. 1AA010

### Research Objective Achievement Plan 21AUN: Development of Criteria for Selection of Stationary Source Measurement Strategies or Methodology and Instrumentation

Objective: Standards of performance for new stationary sources allow measurement of emissions by the methods prescribed or by equivalent or alternate methods approved by the Administrator (40CFR 60.8b). The Standards also require that EPA provide guidance and assistance on the selection and use of required monitoring equipment. The output of this ROAP will be performance criteria and data upon which the Administrator can adequately assess the capability and accuracy of "equivalent" or "alternate" measurement procedures.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AUN-002 | Field and evaluation studies of emission measurements in support criteria (gases). | Contract | 103 | Altshuller |

### Research Objective Achievement Plan 21AUO: Research and Development of a Fine Particulate Methodology

Objective: Methods/Instruments for measuring fine particulate loading and size distributions in real time.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AUO-004 | Develop particle collection surface amenable for mass and chemical composition measurements. | Contract | 103 | Altshuller |
| 21AUO-007 | Develop a 2-stage particle fractionator by filtration thru nucleopore surfaces. | Research Grant | 103 | Altshuller |

PROGRAM ELEMENT NO. 1AA010

**Research Objective Achievement Plan 21AUP:** **Research and Development of Personal Dosimeters (Exposure Meters)**

Objective: Personal monitoring devices for use in health effects. studies.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AUP-003 | Miniaturize ozone chemiluminescence analyzer; to include $10^2$ range of integration periods and digital data storage capability. | Contract | 103 | Altshuller |
| 21AUP-006 | Miniaturize $No_2$ dissociation-chemiluminescence analyzer. Variable ($10^2$) integration period, digital data storage. | Contract | 103 | Altshuller |
| 21AUP-009 | Miniaturize electrochemical $SO_2$ instrument. | Contract | 103 | Altshuller |

**Research Objective Achievement Plan 26AAM:** **Instrumentation and Measurement Methods to Determine Aggregate Capacity, Size Distribution, Velocity, Composition, and Mass Loading of Particulates from Stationary Sources**

Objective: Development and demonstration of fully evaluated manual and continuous measurement techniques for selected parameters and monitoring systems for selected parameters of particulate pollutants emitted from various stationary sources with documented techniques for application of the methods and systems to the selected stationary sources. The parameters currently requested include total mass size distribution by mass and number, opacity. chemical composition, mass emission rate, and velocity distribution in the effluent.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 26AAM-012 | Develop portable LIDAR plume Opacity Instrument. | Contract | 103 | Altshuller |
| 26AAM-013 | Develop automatic isokinetic sampling system. | Contract | 103 | Altshuller |
| 26AAM-026 | Develop interface for quantitative aerosol transport for mass and size distribution measurements. | Contract | 103 | Altshuller |

**PROGRAM ELEMENT NO. 1AA010**
**Research Objective Achievement Plan 26AAM**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 26AAM-031 | Evaluate Beta guage in field application to several source types. | Contract | 103 | Altshuller |
| 26AAM-041 | Evaluate the EPA Manual Particulate Sampling Train applied to selected sources to demonstrate efficacy of method for various sources. | Contract | 103 | Altshuller |
| 26AAM-051 | Investigate indirect measurement of mass as alternative to gravimetric measurement. | Contract | 103 | Altshuller |
| 26AAM-056 | Develop improved, simplified, EPA Manual Sampling Train and Test. | Contract | 103 | Altshuller |
| 26AAM-063 | Basic R&D for particle sizing methods for sub micron particulate. | Research Grant | 103 | Altshuller |

**Research Objective Achievement Plan 26AAN: Instrumentation and Measurements for Hazardous Substances Emitted from Stationary Sources**

Objective: Measurement methods for hazardous substances (Asbestos, mercury, beryllium and other potential candidates such as POM, PCB, Cd, As, Pb, Ni, Cr, V, and Mn as designated by the Administrator) emitted from stationary sources.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 26AAN-004 | Development of sampling system for use in measuring total mercury (vapor and particle). | Contract | 103 | Altshuller |
| 26AAN-008 | Development of sampling procedures for polycyclic organic matter and polychlorined biphenyls. | Contract | 103 | Altshuller |

## PROGRAM ELEMENT NO. 1AA010

**Research Objective Achievement Plan 26AAP:** **Instrumentation and Measurements for Gaseous Pollutants Emitted from Stationary Sources**

Objective: New measurement methods and instruments for gaseous pollutants emitted from various stationary sources. Methods and measurement systems will include improved manual methods, in-stack instrumentation and sensors as applicable. Primary pollutants of interest in support of control procedures are sulfur containing compounds, oxides of nitrogen, halides and halide compounds, carbon dioxide and hydrocarbons and odiferous materials. Development of supporting technology flow temperature secondary measurements, sampling and sample conditioning will be accomplished as required to support the primary measurement.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 26AAP-026 | Develop remote passive pollutant sensor by IR emission. | Contract | 103 | Altshuller |
| 26AAP-028 | Investigate Fabry-Perot interferometer/rotational Raman monitoring for NO. | Research Grant | 103 | Altshuller |
| 26AAP-030 | Develop selective hydrocarbon measurement system. | Contract | 103 | Altshuller |
| 26AAP-040 | Gas composition stratification and sampling methods investigation. | Contract | 103 | Altshuller |
| 26AAP-043 | Development of $H_2SO_4$ acid mist measurement system. | Contract | 103 | Altshuller |

**Research Objective Achievement Plan 26ACV:** **Measurement Methods and Instrumentation for Emissions from Mobile Sources**

Objective: Output is in terms of measurement methods and instruments recommended for use in compliance testing of light- and heavy-duty vehicles and other mobile sources for the purpose of implementation of National Emission Standards for Mobile Sources.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 26ACV-018 | Design, develop and build diluters and other sampling interfaces. | Contract | 103 | Altshuller |

**PROGRAM ELEMENT NO. 1AA010**
**Research Objective Achievement Plan 26ACV**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 26ACV-026 | Characteristics and photochemical reactivity of fuel components and combustion products. | Contract | 103 | Altshuller |
| 26ACV-045 | Instrument for formaldehyde in mobile source emissions. | Contract | 103 | Altshuller |
| 26ACV-048 | Development of an advanced proportional sampler. | Contract | 103 | Altshuller |

**PROGRAM ELEMENT NO. 1AA010**

**Research Objective Achievement Plan 26ACX:** **New or Improved Instrumentation for the Measurement of Gaseous Pollutants in Ambient Air**

Objective: Development of suitable manually performed lab methods for quantiative determination of $SO_2$, NO, $NO_2$, $H_2S$ and Se. Prototype field kits shall be designed, constructed and evaluated by 6/30/74. Instrumentation which is simple, reliable, low cost and easy to operate when measuring the atmoshperic concentration of primary pollutants or other substances resulting from chemical transformation in air.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 26ACX-027 | Develop and evaluate reactive organic analyzer that provides functional group analysis (parafins, aromatics, etc.). | Contract | 103 | Altshuller |
| 26ACX-046 | Development of lasers for air pollution analysis. | Research Grant | 103 | Altshuller |
| 26ACX-051 | Develop a solid state $SO_2$ collection device. | Contract | 103 | Altshuller |
| 26ACX-055 | Collection and analysis of CO. | Contract | 103 | Altshuller |
| 26ACX-056 | Collection and analysis of atmoshperic $NO_2$. | Research Grant | 103 | Altshuller |

## PROGRAM ELEMENT NO. 1AA010

**Research Objective Achievement Plan 26AEK:** **New or Improved Methods for the Measurement and Analysis of Ambient Air Particulates**

Objective: Reliable lab methods and instrumentation to measure total and organic carbon, and organic compounds with high physiologic impact. Development of instrumentation to measure Hg, As, Se, Be, Cd, Pb, sulfuric and nitric acids.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 26AEK-038 | Collection and analysis of hazardous metals. | Contract | 103 | Altshuller |

# EQUIPMENT AND TECHNIQUES PROGRAM AREA

## PROGRAM ELEMENT NO. 1BA027 – METHODS DEVELOPMENT FOR IDENTIFICATION OF POLLUTANTS

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $269,000
Contracts: $132,000

Program Element Output: Physical, chemical and biological methods for detection, identification and measurement of water pollutants. Program efforts will be to: (1) develop sensors and methods that will indicate the presence of pollutants and measure their quantity down to required levels, rapidly and continuously; (2) develop the necessary instrumentation to utilize these sensors and methods to identify, measure and trace pollutants automatically and economically both *in situ* and by remote sensing; (3) develop statistical testing plans to enable rapid screening of water for pollutants with a minimum number of samples; and (4) develop mathematical models that predict the sources of a pollutant from the information obtained in downstream testing.

Program Element Director (PED):

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Methods Development & Quality Assurance Research Lab
National Environmental Research Center
Environmental Protection Agency
Cincinnati, OH 45268
Telephone: (513) 684–2925

Dr. David W. Duttweiler
Southeast Environmental Research Lab
Environmental Protection Agency
College Station Road
Athens, GA 30601
Telephone: (404) 546–3183

PROGRAM ELEMENT NO. 1BA027

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| PEMP-012 | Analytical Methodology Seminars and Symposia. | Contract | 104b | Enos |
| PEMP-013 | State-of-the-Art of flow measuring techniques. | Contract | 104b | Enos |
| PEMP-014 | State-of-the-Art of biomonitoring techniques. | Contract | 104b | Enos |

**Research Objective Achievement Plan 05AED:** **Rapid Methods for the Detection and Enumeration of Pathogenic and Indicator Bacteria in Drinking, Recreational and Other Waters**

Objective: A series of recommendations and reports on new or improved methods for the isolation, identification, enumeration and interpretation of bacterial indicators and pathogens in waters and wastewater effluents. The results may include special devices or equipment related to methodology. The recommended methods will be required to implement sections 104b (d) and 304 (g) of the Federal Water Pollution Control Act Amendments of 1972 in determining the health hazard and sanitary quality of water and wastewater. The procedures are also needed for monitoring activities and the enforcement of water quality standards.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 05AED-009 | Procedure for determination of Klebsiella and indicator organisms in industrial effluents. | Research Grant | 104b | Ballinger |
| 05AED-010 | *Candida albicans* as an indicator of estuarine pollution. | Research Grant | 104b | Ballinger |
| 05AED-011 | Fluorescent antibody methods for determination of fecal streptococci. | Research Grant | 104b | Ballinger |

## PROGRAM ELEMENT NO. 1BA027

**Research Objective Achievement Plan 05AEF:** **Methods for Determining Biological Paremeters of all Waters**

Objective: The output will consist primarily of state-of-the-art reports, methods and/or recommendations for sample collection and processing, organism identification, measurement of biomass and rates of biological processes, biomonitoring, bioassay and bioaccumulation, and for processing and interpreting biological data, suitable for development of a biological methods manual for use in field and laboratory studies with plankton, periphyton, macrophyton, macroinvertebrates and fish.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 05AEF-018 | Develop indices of eutrophic condition. | Research Grant | 104b | Ballinger |
| 05AEF-024 | Develop macroinvertebrate sorting and counting device. | Contract | 104b | Ballinger |
| 05AEF-025 | Develop water quality profiles for non-diatom algae. | Research Grant | 104b | Ballinger |
| 05AEF-027 | Develop rapid algal bioassay method. | Research Grant | 104b | Ballinger |
| 05AEF-031 | Develop periphyton identification guide. | Research Grant | 104b | Ballinger |

**Research Objective Achievement Plan 07AAP:** **Methodology for the Concentration, Recovery, and Identification of Viruses from Water**

Objective: Device(s) for processing large quantities of water (including sewage) on site for the recovery of viruses in a sample form suitable for shipping to laboratories for subsequent identification and quantitation of virus species. The device should be adaptable to the processing of waters of very different qualities. Development of a rapid, fully automatic system for identifying viruses within 12 hours.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 07AAP-006 | Detection of induced oncogenesis in the water. environment and in man. | Research Grant | 104b | Ballinger |
| 07AAP-010 | Methodology development for detection of virus indicators. | Research Grant | 104b | Ballinger |

## PROGRAM ELEMENT NO. 1BA027

**Research Objective Achievement Plan 16ACG: Identification of Chemical Pollutants in Municipal Wastewaters**

Objective: Research reports listing pollutants remaining in municipal and domestic wastes and sludges treated by biological, physical-chemical, and septic tank systems as well as pollutants produced by chlorination. Quantities of important pollutants will be reported. New methods of analysis will be developed as necessary and made available to others doing wastewater analysis. Spectra of identified compounds will be provided for computerized spectral files to identify organic pollutants in municipal wastewater.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 16ACG-004 | Identify chlorinated organics in treated and chlorinated municipal wastes. | Research Grant | 104b | Duttweiler |

**Research Objective Achievement Plan 16ADN: Identification of Organic, Inorganic, and Elemental Chemical Pollutants in Water**

Objective: Research reports recommending which separation, concentration, measuring, and interpreting techniques should be used for the identification and quantifying of pollutants. Detailed, standardized methodology will not be provided.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 16ADN-064 | Establish a taste-and-odor panel. | Research Grant | 104b | Duttweiler |
| 16ADN-067 | Develop x-ray fluorescence techniques for the analysis of water and sediment samples. | Contract | 104b | Duttweiler |
| 16ADN-071 | Develop plasma emission spectroscopic methods for the analysis of water. | Research Grant | 104b | Duttweiler |

## EQUIPMENT AND TECHNIQUES PROGRAM AREA

### PROGRAM ELEMENT NO. 1EA079 – PESTICIDES IDENTIFICATION METHODOLOGY

Funds: No extramural Tasks remaining which are planned for funding in the current Fiscal Year.

Program Element Output: Multi-residue methods for determining the extent of human and animal exposure to persistent and biodegradable pesticides. The program will provide information on the action mechanisms of pesticides and their metabolic products and will develop the methodology for the isolation, detection, identification, confirmation and quantification of pesticide residues, metabolites and other chemical contaminants. Data developed by this program will support administrative decisions concerning the registration of pesticides.

Program Element Director (PED):

Dr. William F. Durham
Pesticide & Toxic Substances Effects Lab
National Environmental Research Center
Environmental Protection Agency
Research Triangle Park, NC 27711
Telephone: (305) 238-6110

## EQUIPMENT AND TECHNIQUES PROGRAM AREA

### PROGRAM ELEMENT NO. 1FA084 – RADIATION METHODS AND MEASUREMENTS

Funds: No extramural Tasks remaining which are planned for funding
in the current Fiscal Year.

Program Element Output: New or improved methods, instrumentation and theoretical models required to determine the concentrations of radioactive materials and the intensity of electromagnetic radiation in various media, with emphasis on biological materials. Program effort will be directed towards the development of laboratory exposure calibration facilities and field measurements systems.

Program Element Director (PED):

Dr. R. John Garner
Experimental Biology Laboratory
National Environmental Research Center
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## EQUIPMENT AND TECHNIQUES PROGRAM AREA

### PROGRAM ELEMENT NO. 1HA326 – ADVANCED MONITORING TECHNIQUES

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $ 19,000
Contracts: $216,000

Program Element Output: Testing and evaluation of techniques and analytical methodology for advanced remote sensing and *in situ* sensing of environmental parameters. As new technology is developed for sensing environmental pollutants or their effects, plans and programs to test and evaluate capabilities and assess proper techniques for operational implementation will be developed and evaluated to ensure that acquired sensor data are compatible with and of suitable quality for analyses. Monitoring networks will be operated to ensure technical and operational support for the Regions, the Office of Research and Development, the Office of Enforcement & General Counsel and the Office of Air & Water Programs.

Program Element Director (PED):

Dr. S. David Shearer
Quality Assurance & Environmental
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National Environmental Research Center
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Mr. George Morgan
Monitoring Systems Research & Development Lab
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Mr. Donald Wruble
Monitoring Operations Division
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## PROGRAM ELEMENT NO. 1HA326

### Research Objective Achievement Plan 22ACA: Continue Analysis of Fuels and Fuel Additive Samples Collected Nationally

Objective: Reports issued routinely will describe the chemical and physical composition of fuels (gasoline, aviation fuel, heating oil, diesel fuel, motor oil, etc.) and fuel additives representative of nationwide consumption. Analytical methodologies developed, evaluated, and/or modified as part of this activity will also be described in definitive reports.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 22ACA-015 | Analyze 1500 fuel samples annually for selected trace elements. | Contract | Mixed | Shearer |

### Research Objective Achievement Plan 22ACQ: Biological Monitoring for Environmental Pollutants

Objective: A series of reports will address quantitative relationships between pollutant concentration and the biological response sequence, e.g., latent and recovery periods plus dose-response curves, when such information has a practical monitoring application.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 22ACQ-002 | Contract to establish criteria to be used in compiling an annotated bibliography of terrestrial plant responses to pollutants. | Contract | Mixed | Shearer |
| 22ACQ-004 | Contract to extend the bibliography to cover terrestrial animals, including insects and microorganisms as separate portions. | Contract | Mixed | Shearer |

## PROGRAM ELEMENT NO. 1HA326

**Research Objective Achievement Plan 22ACS: Design of Pollutant-Oriented, Integrated Monitoring Systems**

Objective: Reports defining pollutant-oriented, integrated monitoring system objectives in analytical terms and hypothetical minimum adequate monitoring networks to achieve those objectives; including samples to be collected, sampling sites, sampling schedules, sample handling procedures, analyses, and data reporting formats. Research reports documenting results of laboratory and field investigations to validate the hypothetical design. Report setting quality assurance procedures for field-validated networks. Reports defining all elements of the final field-validated total monitoring system.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 22ACS-002 | Contract for transport and effects studies suggested by literature survey and consultations with other NERC's and pertinent scientific groups. | Contract | Mixed | Wruble |

**Research Objective Achievement Plan 22ACY: Interagency Program for Sensor Evaluation and Conference Support**

Objective: To fulfill the requirements, funds will be transferred under interagency agreement and grants to provide for consultation services. Final reports will be produced from the user's point of view and will recognize economic, social, legal, political, and other factors in addition to technical considerations in making recommendations to EPA.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 22ACY-001 | Consult in services of CORSPERS Committee and other participating organizations. | Research Grant | Mixed | Enos |
| 22ACY-002 | Support of Symposium of Remote Sensing of the Environment. | Demo Grant | Mixed | Enos |

## QUALITY ASSURANCE PROGRAM AREA

The objectives of the Quality Assurance Program Area are the planning, establishing, and coordinating an Agency-wide standardization and quality control program to assure that environmental data produced by Federal, State, and local agencies are compatible, accurate, and legally defensible and assuring the selection, evaluation, standardization, and publication of procedures and methods for sampling and analyzing environmental pollutants.

Program Area Manager (PAM):

Mr. Guntis Ozolins
Quality Assurance Division
Office of Research and Development
Environmental Protection Agency
Waterside Mall
Washington, DC 20460
Telephone: (202) 755-0646

## QUALITY ASSURANCE PROGRAM AREA

### PROGRAM ELEMENT NO. 1HA327 – MONITORING QUALITY ASSURANCE

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: **NONE**
Contracts: See **RFP** when issued.

Program Element Output: Planning, establishing, and coordinating an Agency-wide standardization and quality control program to assure that environmental data produced by Federal, State, and local agencies are compatible, accurate, and legally defensible. Assures the selection, evaluation, standardization, and publication of procedures and methods for sampling and analyzing environmental pollutants and reporting data as implemented by the National Environmental Research Center's. Assures the establishment of procedures for and determination of the acceptability and equivalence of methods and instruments for field use. Develops and reviews the implementation of the Agency-wide quality control program for environmental monitoring. Assures the preparation and dissemination of appropriate guidelines and provides technical assistance in the area of quality assurance to Regional Office, State, and local monitoring programs to assure a systematic and coordinated approach for the definition of environmental quality. In addition, evaluates monitoring procedures in use and recommends changes as needed.

Program Element Director (PED):

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Mr. George Morgan
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## PROGRAM ELEMENT NO. 1HA327

Program Element Director (PED):

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Dr. Bernd Kahn
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Cincinnati, OH 45268
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**PROGRAM ELEMENT NO. 1HA327**

**Research Objective Achievement Plan 26AAG:** **Evaluation and Standardization of Methods for Measuring Emissions from Stationary Sources**

Objective: Reports describing methods and their limits of accuracy, precision and application.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 26AAG-008 | Evaluation, including collaborative testing, of emission test methods specified for particulates in at least one selected industry of Group II or Group III of New Source Performance Standards. | Contract | Mixed | Shearer |

# IMPLEMENTATION RESEARCH PROGRAM AREA

This area includes research that will assist EPA in implementing its environmental protection responsibilities. This includes examining alternative approaches to environmental protection; supporting social and economic research; identifying new pollution control needs and alternate control strategies; and estimating direct social, physical, and economic cost impacts of environmental pollution.

Economic Analysis develops and applies improved data and techniques for benefit/cost evaluations of pollution control.

Standards Research focuses on developing improved methodology for setting and implementing environmental protection standards.

Ecological Studies and Technology Assessment focuses on research that will assist the EPA in carrying out its responsibilities under the National Environmental Policy Act (NEPA) of 1969, as well as carrying out other ecological studies primarily of a non-economic nature.

Systems Evaluation includes research on fiscal and other non-NEPA alternatives to standard setting to implement environmental protection.

Program Area Manager (PAM):

Dr. Alan P. Carlin
Implementation Research Division
Washington Environmental Research Center
Environmental Protection Agency
Waterside Mall
Washington, DC 20460
Telephone: (202) 755-0650

# IMPLEMENTATION RESEARCH PROGRAM AREA

## PROGRAM ELEMENT NO. 1AA004 – ECONOMIC CRITERIA

Funds: No extramural Tasks remaining which are planned for funding in the current Fiscal Year.

Program Element Output: Development of an economic basis for environmental decision-making as it relates to air pollution. To accomplish this goal, the following functions are to be performed: (1) provide Congress, EPA, and the public a comprehensive annual study of the economic consequences of Federal Air Pollution Legislation; (2) evaluate and propose inducements to control air pollution; (3) investigate the economic consequence of specific situations associated with air pollution abatement; (4) conceptualize and assess, in economic terms, the benefits to be derived from air pollution abatement; (5) provide economic information necessary for the development and implementation of air pollution regulations; and (6) investigate, explain and predict the relationship of cleaner air to other environmental and economic goals.

Program Element Director (PED):

Mr. Thomas E. Waddell
Office of the Director
National Environmental Research Center
Environmental Protection Agency
Research Triangle Park, NC 27711
Telephone: (919) 549–8411

## IMPLEMENTATION RESEARCH PROGRAM AREA

### PROGRAM ELEMENT NO. 1BA030 - WATER QUALITY IMPLEMENTATION RESEARCH

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $134,000
Contracts: $425,000

Program Element Output: (1) Effective planning and optimization techniques for water quality management; (2) new or improved methods of data acquisition, transmission, processing and application; (3) innovation institutional arrangements for water quality management; and (4) techniques for evaluating the air pollution and solid waste effects of water pollution control. Emphasis will be on the socio-economic aspects. Program results will include reports, recommendations, demonstrations of practicality, and design criteria.

Program Element Director (PED):

Mr. Roger Shull
Washington Environmental Research Center
Environmental Protection Agency
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Washington, DC 20460
Telephone: (703) 557-7490

## PROGRAM ELEMENT NO. 1BA030

### Research Objective Achievement Plan 08AAU: Systems Evaluation for Water Reuse and Conservation

Objective: (1) A set of guidelines for local and regional decision-making regarding cyclic and sequential water reuse systems. (2) A set of guidelines for conceptual design of reuse systems. (3) An evaluation of the equity of water rate structures and the effect of pricing on water demand.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 08AAU-003 | Conduct expanded legal-economic water use system evaluation in western region. | Research Grant | 104b | Shull |

### Research Objective Achievement Plan 09AFG: Areawide Water Quality Planning and Management

Objective: Reports documenting objectives and organizational structures of existing areawide water quality planning and management (AWWQPM) agencies and their operating costs, efficiencies and effectiveness. Later reports will recommend better systems, and provide methods for practical application of quantitative planning and management methods and consideration of total environmental impact.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 09AFG-005 | Conduct quantitative study of planning and management functions in regional agencies. | Contract | 104b | Shull |
| 09AFG-006 | Develop guidance for cost-effective application of quantitative management methods. | Contract | 104b | Shull |

## PROGRAM ELEMENT NO. 1BA030

**Research Objective Achievement Plan 10AGP:** **Evaluation of Alternative Options for Managing Dispersed Agricultural Pollution**

Objective: The overall aim is to manage runoff and return flows from farmland for water quality improvement within the appropriate system's context whether it be watershed, river basin or river system. This objective is to be achieved by a comprehensive report or a series of reports elaborating feasible management strategies which takes into consideration the pertinent technological, economic, legal and institutional implications.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 10AGP-003 | Appraisal of economic impacts of likely management options; design pilot study or studies. | Contract | 104b | Shull |

**Research Objective Achievement Plan 20AAB:** **Benefits of Water Pollution Control**

Objective: Estimates of total benefits and associated costs-of-control in achieving various water quality levels. Relative magnitudes of benefits and costs as they are distributed by receptor and emitter source. Benefit-cost methodology report to Congress.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 20AAB-001 | Development of methodology for economic implications of water pollution. | Contract | 104b | Shull |
| 20AAB-002 | Estimation of pollution damages to recreational water uses in specific regions. | Contract | 104b | Shull |
| 20AAB-004 | Formulation of economic damage functions relating human health to drinking water quality. Extrapolation of national health loss estimates from these functions. | Contract | 104b | Shull |

**PROGRAM ELEMENT NO. 1BA030**
**Research Objective Achievement Plan 20AAB**

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 20AAB-005 | Development of techniques to measure intangible benefits, e.g. aesthetics, of water quality control. Risk analysis pertaining to an assessment of ecological damages or the preception of damages thereof. | Contract | 104b | Shull |

**PROGRAM ELEMENT NO. 1BA030**

**Research Objective Achievement Plan 21AQT: Analysis of Water Quality and Effluent Standards**

Objective: Research reports evaluating existing (water) standards and recommendations for modifications to the standards which will lead to improvement in each of these areas. Wherever possible research effort will be geared to specific problems as reflected in needs statements.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AQT-004 | Evaluate the reliability achieved in meeting water quality standards, given the stochastic nature of effluent and hydrologic inputs—investigate costs and benefits of various levels of reliability. | Research Grant | 104b | Shull |
| 21AQT-008 | Evaluate alternative forms of standards for sludge and effluent discharge from municipal plants in terms of technical feasibility, cost, and public acceptibility. Determine the impact of effluent guidelines on these standards. | Contract | 104b | Shull |

**Research Objective Achievement Plan 21AXN: Economic Incentives for Water Quality Controls**

Objective: Report(s) containing a series of different concepts of economic incentives and complete theoretical and implementation analyses for each concept so that a sound recommendation on this control method can be made to the Agency.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AXN-004 | Analyze the structure of a system of discharge permits. | Contract | 104 | Shull |

## PROGRAM ELEMENT NO. 1BA030

**Research Objective Achievement Plan 21AZC:** **Implementation of Water Resource Management to Improve Environmental Quality**

Objective: Analyses of the environmental impact of alternate water management plans for areas of national significance where there have been major conflicts between a wide spectrum of environmental and other objectives. Reports should demonstrate the usefulness of planning as a tool for environmental protection and should include implementation recommendations.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AZC-002 | Develop methodology for identifying and evaluating the environmental impact of management options for land and water resources where there are conflicting goals of national significance and prepare a report demonstrating their application in the Atchafalaya Basin, La. | Contract | 104b | Shull |

## IMPLEMENTATION RESEARCH PROGRAM AREA

### PROGRAM ELEMENT NO. 1DA312 – BEHAVIORAL RESEARCH

Funds: No extramural Tasks remaining which are planned for funding in the current Fiscal Year.

Program Element Output: Improved understanding of human behavior and of materials systems as they relate to the generation and disposal of solid waste, leading to strategies for reducing solid waste loads and for increasing resource recovery.

Program Element Director (PED):

Mr. Robert Stenburg
Solid and Hazardous Waste Research Lab
National Environmental Research Center
Environmental Protection Agency
Cincinnati, OH 45268
Telephone: (513) 684–4477

# IMPLEMENTATION RESEARCH PROGRAM AREA

## PROGRAM ELEMENT NO. 1DA315 - ECONOMIC BENEFIT ANALYSIS

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $60,000
Contracts: See **RFP** when issued

Program Element Output: A quantitative estimate of the social benefits of solid waste management programs. Program efforts will be directed towards developing methodology for estimating the externalities associated with solid waste collection, recycling and disposal and with virgin materials use.

Program Element Director (PED):

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**PROGRAM ELEMENT NO. 1DA315**

**Research Objective Achievement Plan 05BBF:** **Benefit and System Analysis of Alternative Control Strategies for the Recovery or Disposal of Hazardous Materials and Other Priority Substances**

Objective: Research reports containing quantitative estimates of benefits and costs for each material, for each recovery or disposal technique, and each control policy option.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 05BBF-005 | Study of the generation of hazardous and/or recoverable materials from air and water pollution abatement processes. | Contract | 204 | Abel |
| 05BBF-009 | Study of the environmental benefits of resource recovery. | Research Grant | 204 | Abel |

## IMPLEMENTATION RESEARCH PROGRAM AREA

### PROGRAM ELEMENT NO. 1HA091 – STANDARDS RESEARCH

Funds: Available as of November 3, 1973 for support of listed Tasks:

| | |
|---|---|
| Grants: | $143,000 |
| Contracts: | $ 50,000 |

Program Element Output: Recommendations leading to adoption of economically efficient and socially equitable standards for the protection and enhancement of environmental values. The standards sought will encompass a broad range of interconnected environmental problems involving ambient environmental quality condition, measurements, and evaluations, waste residuals production and disposal, plant location, land use and transportation controls, materials recycling, emissions data and accounting.

Program Element Director (PED):

Mr. Roger Shull
Washington Environmental Research Center
Environmental Protection Agency
Crystal Mall Bldg 2
Washington, DC 20460
Telephone: (703) 557–7490

**PROGRAM ELEMENT NO. 1HA091**

**Research Objective Achievement Plan 21ARF: Empirical Studies of Standards Applications**

Objective: Evaluations of standards applications experience with primary focus on inter-relationships between air and water pollution controls and role of zoning controls in dealing with pollution problems. Major FY 74 output (begin in FY 73) will include administrative, economic and other approaches to resolution of wastewater disposal problems; relationship of this problem to air and water quality controls and zoning will be considered. Alternative disposal means will be explored (together with social economic obstacles) for possible solutions.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ARF-002 | Review and summarize literature and ongoing research towards assessing the utility of existing media standards and new multimedia standards. Determine the major standards in use and the scheduled transition points for modification of old standards or issuance of new standards. Determine which governmental activities produce standards and regulations which have an impact on environmental quality. Identify the institutional interactions involving environmental standards. | Contract | Mixed | Shull |
| 21ARF-004 | Develop and improve methodologies for assessment of Federal/State and local standards effectiveness. Test methodology for assessment on several regional areas. Assess the effects of implementing media standards on the quality of the environment and modify the methodology to account for changes in the mix or emphasis of standards including multimedia and/or multi-pollutant standards. | Contract | Mixed | Shull |

## PROGRAM ELEMENT NO. 1HA091

**Research Objective Achievement Plan 21ARG: Analysis of Environmental Standards**

Objective: Research reports evaluating existing standards according to the criteria described below, and recommendations for modifications to the standards which will lead to improvement in each of these areas.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ARG-002 | Evaluate the economic efficiency and multimedia impact of environmental standards. Quantify the extent of intermedia transfer of residual disposal burden caused by environmental standards. | Contract | Mixed | Shull |
| 21ARG-005 | Estimate reliability and maintainability achieved by environmental management systems in meeting standards. Describe inputs to environment statistically, to transform into ambient conditions and describe reliability with which standards are met. | Research Grant | Mixed | Shull |
| 21ARG-011 | Evaluate the effects on water quality of implementation of air quality standards set under Clean Air Act. | Contract | Mixed | Shull |

## IMPLEMENTATION RESEARCH PROGRAM AREA

### PROGRAM ELEMENT NO. 1HA093 - SYSTEMS EVALUATION

Funds: Available as of November 3, 1973 for support of listed Tasks:

| | |
|---|---|
| Grants: | $ 65,000 |
| Contracts: | $107,000 |

Program Element Output: Expansion of the economic and systems analysis capacities of the Environmental Protection Agency and the Office of Research and Development. This expanded capability will be used to evaluate, among other things: alternative environmental improvement strategies; the economic aspects of OR&D program choices; the interactions between the legal and economic systems in environmental matters; the system implications of pesticide use and control; and the effect on the socio-economic system of environmental policies concerning energy production and use.

Program Element Director (PED):

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**PROGRAM ELEMENT NO. 1HA093**

**Research Objective Achievement Plan 09AFD: Economic Incentive Systems for Environmental Improvement**

Objective: A report will be issued which details the implications for both environment quality and traditional economic variables of implementing specified incentive system measures. The report will indicate the conditions under which a particular alternative would be preferred; the reasons for this preference; and the likelihood of these conditions occurring.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 09AFD-002 | Study of air pollution emission charges. | Contract | Mixed | Shull |
| 09AFD-004 | Development of economic incentives to reduce mobile source air Pollution Emissions. | Research Grant | Mixed | Shull |

**Research Objective Achievement Plan 20AAC: Research Reports Examining Intermedia Impacts for Major Pollutants and the Institutions Dealing with Intermedia Problems**

Objective: Research reports examing intermedia impacts for major pollutants and the institutions dealing with intermedia problems.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 20AAC-002 | Investigation of the pollution control costs for multimedia polluters. | Research Grant | Mixed | Shull |

## PROGRAM ELEMENT NO. 1HA093

**Research Objective Achievement Plan 21AQL:** **Energy Conservation and Environmental Quality**

Objective: Reports which detail, in quantitative terms, the systems alternatives which can reduce adverse environmental impacts. Information and methodology for decision-makers to use in evaluating energy strategies.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AQL-011 | Analysis of regional energy demand, price, and environmental impacts. | Research Grant | Mixed | Shull |

**Research Objective Achievement Plan 21BAT:** **Systems Analysis of Pesticide Problems**

Objective: Research reports containing an evaluation of alternative means of reducing the damages caused by the over-application of pesticides.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21BAT-003 | Determination of pesticide problem control priorities. | Contract | Mixed | Shull |
| 21BAT-004 | Systems evaluation of alternative pesticide control policies. | Contract | Mixed | Shull |

## IMPLEMENTATION RESEARCH PROGRAM AREA

### PROGRAM ELEMENT NO. 1HA094 – ECONOMICS RESEARCH

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $140,000
Contracts: $ 85,000

Program Element Output: Economic information for use in environmental decision making. To accomplish this goal, the following functions are to be performed on a continuing basis: (1) provide Congress, EPA and the public comprehensive studies of the economic consequences of current or proposed pollution legislation; (2) evaluate and propose economic means of controlling pollution; (3) investigate the economic consequence of specific situations associated with pollution abatement; (4) conceptualize and assess, in economic terms, the benefits to be derived from pollution abatement; (5) conceptualize and assess in economic terms the direct and indirect costs of achieving pollution abatement; (6) provide economic information necessary in the development and implementation of pollution regulations; (7) investigate, explain, and predict the relationship of pollution abatement to environmental, social and economic goals.

Program Element Director (PED):

Dr. Fred Abel
Washington Environmental Research Center
Environmental Protection Agency
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Telephone: (703) 557-7480

## PROGRAM ELEMENT NO. 1HA094

**Research Objective Achievement Plan 17BAB: Analysis of Environmental Risks Associated with Nuclear Power**

Objective: (1) State-of-the-art review of risk evaluation. (2) Risk/benefit functions (with confidence bands).

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 17BAB-001 | State-of-the-art review of risk evaluation and quantitative estimation of risk/benefit functions (with confidence bands). | Research Grant | Mixed | Abel |

**Research Objective Achievement Plan 20AAA: Determine Environmental Quality Benefit Functions**

Objective: Functional forms to estimate total and marginal benefits of environmental quality enhancement. Display of benefit functions so that losses can be rapidly assessed for changing environmental quality levels.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 20AAA-004 | Estimate marine – industry damages due to water pollution. | Research Grant | Mixed | Abel |
| 20AAA-005 | Estimate health damages due to pesticides. | Research Grant | Mixed | Abel |

**PROGRAM ELEMENT NO. 1HA094**

**Research Objective Achievement Plan 21ARQ: Benefits of Noise Abatement**

Objective: Economic cost and benefit functions which will assist legislators, EPA policy-makers, EPA program and enforcement officers and local governments in making decisions about level of control.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21ARQ-001 | Determine the state-of-knowledge of damage from noise. | Contract | Mixed | Abel |

**Research Objective Achievement Plan 21AVT: Economics of Pesticides Control**

Objective: Estimates of the costs and benefits, in economic terms, from implementing various pesticides control strategies. Economic evaluation of alternative means of control. Optimal strategies for the maintenance of food supplies and quality.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AVT-004 | Compare national costs and damages to society of using alternative methods of pest management. | Contract | Mixed | Abel |

## IMPLEMENTATION RESEARCH PROGRAM AREA

### PROGRAM ELEMENT NO. 1HA095 - ECOLOGICAL IMPACT

Funds: No extramural Tasks remaining which are planned for funding
in the current Fiscal Year.

Program Element Output: Evaluation of the broader questions of environmental impact without regard to medium or category. The Office of Research and Development will expand its research in this area by: (1) carrying out research that will help EPA to make comments on environmental impact statements prepared by other Federal agencies; (2) investigating aspects of environmental quality not adequately considered in present environmental impact analyses; (3) developing measures of these and other aspects of environmental quality so as to determine change over time; and (4) investigating the underlying causes of environmental problems.

Program Element Director (PED):

Dr. Edwin Royce
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# ENVIRONMENTAL STUDIES PROGRAM AREA

Research in this area seeks to forecast developing environmental problems before they become crises to provide tools for testing alternative policies, develop a greater environmental sensitivity within the planning process and disseminate useful environmental management and problem-solving techniques to the regional, state and local levels.

Forecasting and analysis efforts are intended to review the state-of-the-art national and urban/regional forecasting and planning techniques, to conceptualize and develop improved analytical techniques, and to improve the capability for analyzing environmental problems in their total context. One of the forecasting approaches used is based on computer-assisted system modeling. Several comprehensive systems are being developed for varying time horizons and varying geographic areas and levels of aggregation. Emphasis is on making these systems useful to policy makers without extensive technical training. Using these systems, alternative environmental policy decisions can be tested, potential problems forecast and new options developed.

Efforts to improve the environmental sensitivity of the comprehensive planning process include investigations into the environmental impacts of land-use planning, attitudinal patterns, political and economic institutional arrangements, population patterns, carrying capacities and resource usage. Existing tools used by planners are analyzed to determine their efficacy in reaching environmental goals. Effective methodologies, both established and experimental, are studied and the results are distributed to planners at all levels. The human implications of various environmental policies are considered in an effort to make the planning process as comprehensive and effective as possible.

For environmental managers, research is conducted to assess effective environmental management systems in terms of institutional structure and of the interchange of information and responsibility at various levels of government. These systems are rated in terms of their effectiveness in meeting mandated and desired environmental goals. Research is beginning into techniques for providing the information and expertise environmental managers need to make urgent and important decisions regarding real or potential local environmental problems.

Program Area Manager (PAM):

Dr. Peter House
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## ENVIRONMENTAL STUDIES PROGRAM AREA

### PROGRAM ELEMENT NO. 1HA096 – ENVIRONMENTAL FORECASTING AND ANALYSIS

Funds: Available as of November 3, 1973 for support of listed Tasks:

| | |
|---|---|
| Grants: | $101,000 |
| Contracts: | $425,000 |

Program Element Output: Development of an improved understanding of the relationship between environmental problems and the totality of society, including its environmental, social, economic and institutional systems, and the means by which environmental policy and technology can be designed to conform with and effectively utilize these systems. Program emphasis will be given to understanding the basic forms of growth and change in urban and regional systems; developing and evaluating comprehensive models for the assessment of the impact of environmental policy decisions; and identifying institutional forms which might be channeled to achieve environmental quality goals.

Program Element Director (PED):

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PROGRAM ELEMENT NO. 1HA096

**Research Objective Achievement Plan 21AZF:** **Development, Testing and Application of Metropolitan/Regional Analytical Tools**

Objective: Metropolitan/regional analytical tools are needed by planners and policy-makers to assist in development and evaluation of comprehensive metropolitan plans.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21AZE-002 | Development of an integrated multi-media model . | Research Grant | Mixed | House |
| 21AZE-003 | Design and development of a linked system of urban models. | Research Grant | Mixed | House |
| 21AZE-006 | Determine methodology for industrial siting with minimal environmental effects. | Contract | Mixed | House |
| 21AZE-007 | Determine environmental effects of increased agricultural land use. | Contract | Mixed | House |
| 21AZE-008 | Design and develop a model of land use. | Contract | Mixed | House |
| 21AZE-009 | Design and develop model for regional analysis. | Contract | Mixed | House |

## ENVIRONMENTAL STUDIES PROGRAM AREA

### PROGRAM ELEMENT NO. 1HA097 - ENVIRONMENTAL MANAGEMENT RESEARCH

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $38,000
Contracts: See **RFP** when issued.

Program Element Output: Development of an interactive network of Environmental Studies Centers which provide the technical and institutional capability for evaluating the comprehensive and long-range impact of alternative policy decisions. Emphasis will be given to use and dissemination of decision-making methodology including comprehensive models.

Program Element Director (PED):

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## PROGRAM ELEMENT NO. 1HA097

**Research Objective Achievement Plan 09AFC:** **The Assessment of Effective Environmental Management Systems**

Objective: A total analysis of the institutional structure at the various levels of government and how they relate to the accomplishment of mandated and desired goals.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 09AFC-002 | Production of research design for environmental task force. | Research Grant | Mixed | House |
| 09AFC-003 | Series of on-site, case study analyses of local governments' environmental management procedures and transfer of methodologies. | Contract | Mixed | House |

## ENVIRONMENTAL STUDIES PROGRAM AREA

### PROGRAM ELEMENT NO. 1HA098 – COMPREHENSIVE ENVIRONMENTAL PLANNING RESEARCH

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $549,000
Contracts: NONE

Program Element Output: Development of effective means for: (1) defining future environmental conditions, (2) relating these future conditions to existing conditions and trends, and (3) defining alternative means for achieving these future conditions. By using these tools the environmental policy-maker will be able to assess more effectively the long-term consequences of his decisions and to continually adjust his policy in order to achieve the desired set of future conditions. Program emphasis will be given to developing reliable quality of life indicators; defining alternative paths to reach desired futures; identifying new forms of pollution; and fostering the inclusion of environmental considerations in the comprehensive plans of communities, Regions, and States.

Program Element Director (PED):

Dr. Peter House
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## PROGRAM ELEMENT NO. 1HA098

**Research Objective Achievement Plan 20AAG:** **Development of New Tools and Methodologies for Comprehensive Environmental Planning**

Objective: Methodologies which (1) describe the complex relationships; (2) indicate decisionmaking consequences; (3) allows for making trade-offs; (4) foster transferability of techniques and (5) evaluate growth/environmental quality relationships.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 20AAG-002 | Role of the State in Land Use planning. | Research Grant | Mixed | House |
| 20AAG-003 | Environmental standards in the Center City. | Research Grant | Mixed | House |
| 20AAG-004 | Alternative Futures Symposium | Research Grant | Mixed | House |
| 20AAG-005 | Utilization of carrying capacity in Metro planning. | Research Grant | Mixed | House |
| 20AAG-006 | Special planning problems of older cities. | Research Grant | Mixed | House |
| 20AAG-008 | Effects of pollution control on local revenue. | Research Grant | Mixed | House |

**PROGRAM ELEMENT NO. 1HA098**

**Research Objective Achievement Plan 21BAX:** **Quality of Life Indicator Methodology**

Objective: The output will consist of reports that describe: (1) how the methodology can be used; (2) how valid the methodology is; (3) what the weaknesses and strengths of it are.

| ROAP/TASK Number | Task Description | Expected Funding Mechanism | Auth. Leg. | Cognizant PAM/PED |
|---|---|---|---|---|
| 21BAX-002 | Development of a quality of life dissatisfaction index. | Research Grant | Mixed | House |
| 21BAX-003 | Development of a national quality of life profile. | Research Grant | Mixed | House |

## MINORITY INSTUTIONS RESEARCH SUPPORT PROGRAM AREA

Assistance to minority institutions in utilizing their environmental research capability to participate in EPA research activities.

### PROGRAM ELEMENT NO. 1HA323 – MINORITY INSTITUTIONS RESEARCH SUPPORT

Funds: Available as of November 3, 1973 for support of listed Tasks:
Grants: $500,000
Contracts: **NONE**

Program Element Output: Assistance to minority institutions in utilizing their environmental research capability to participate in EPA research activities. Program efforts will be directed to: (1) identify research capabilities within minority institutions, and (2) award research grants in a manner which will support the research needs of Office of Research and Development and enhance the research capabilities of the institutions.

Program Area Manager (PAM):

Dr. Willie Ashley, Jr.
Minority Institutions Research Support
Environmental Protection Agency
Waterside Mall
Washington, DC 20460
Telephone: (202) 755–2524

| **ROAP/TASK Number** | **Task Description** | **Expected Funding Mechanism** | **Auth. Leg.** | **Cognizant PAM/PED** |
|---|---|---|---|---|
| PEMP-004 | Award research grants to minority institutions, in a manner which will support achievement of OR&D's research objectives and which will assist these institutions in expanding their environmental research capability. | Research Grant | Mixed | Ashley |

# APPENDIX A

# EXTRAMURAL PROGRAM AUTHORIZING LEGISLATION

This Appendix is keyed to the Authorizing Legislation Code shown in Part II for each Task listed. These Codes are listed in this Appendix in numerical order.

Auth. Leg. Code

14

**Statutory authority:** Section 14, Noise Control Act of 1972 (P.L. 92–574) 42 U.S.C. 4900.

**Purpose:** To conduct research on the effects, measurement and control of noise including, but not limited to, investigation of the psychological and physiological effects of noise on humans and the effects of noise on domestic animals, wildlife and property and determination of acceptable levels of noise on the basis of such effects, the development of improved methods and standards for measurement and monitoring of noise and the determination of the most effective and practical means of controlling noise emissions.

**Eligible grantees:** Non-profit institutions of higher education or non-profit organizations whose primary purpose is the conduct of scientific research.

**Funding limitations:** Grants may not exceed 95 percent of the estimated total eligible cost of the project.

**Other limitations:** None

20

**Statutory authority:** Section 20, Federal Insecticide, Fungicide and Rodenticide Act, as amended (P.L. 92–516) --- 7 U.S.C. 135 et seq.

**Purpose:** To develop biologically integrated alternatives for pest control and to conduct other research as necessary to carry out the purposes of the Act.

**Eligible grantees:** Universities or others.

**Funding limitations:** Grants may not exceed 95 percent of the estimated total eligible cost of the project.

**Other limitations:** None

103

**Statutory authority:** Section 103, Clean Air Act, as amended (P.L. 88–206) --- 42 U.S.C. 1857 b.

**Purpose:** To support and promote the coordination of research, development and demonstration projects relating to the causes, effects, extent, prevention and control of air pollution.

**Eligible grantees:** Air pollution control agencies, other public or non-profit private agencies, institutions and organizations and individuals.

**Funding limitations:** Grants may not exceed 95 percent of the estimated total eligible cost of the project.

103 **Other limitations:** None

104 **Statutory authority:** Section 104, Clean Air Act, as amended (P.L. 88-206) --- 42 U.S.C. 1857 b-1.

**Purpose:** To support research and development projects on new and improved methods having industrywide application for the prevention and control of air pollution resulting from the combustion of fuels.

**Eligible grantees:** Public or nonprofit agencies, institutions, organizations and individuals.

**Funding limitations:** Grants may not exceed 95 percent of the estimated total eligible cost of the project or $1,500,000, whichever is less.

**Other limitations:** None

104b **Statutory authority:** Section 104 (b)(3), Federal Water Pollution Control Act, as amended, (P.L. 92-500) --- 33 U.S.C. 1254.

**Purpose:** Conduct and promote the coordination and acceleration of research, investigations, experiments and demonstrations relating to the causes, effects, extent, prevention, reduction, and elimination of water pollution.

**Eligible grantees:** State water pollution control agencies, interstate agencies, other public or nonprofit private agencies, institutions, organizations and individuals.

**Funding limitations:** Grants may not exceed 95 percent of the estimated total elibible cost of the project

**Other limitations:** Grants to River Study Centers shall not exceed $1,000,000 in any one Fiscal Year.

105 1) **Statutory authority:** Section 105 (a), Federal Water Pollution Control Act, as amended, (P.L. 92-500) 33 U.S.C. 1255.

**Purpose:** To assist in the development of (1) projects to demonstrate new or improved methods of preventing, reducing, and eliminating the discharges into any waters of pollutants from sewers which carry storm water or both storm water and pollutants; or (2) projects to demonstrate advanced waste treatment and water purification methods or new or improved methods of joint treatment systems for municipal and industrial wastes.

**Eligible grantees:** States, municipalities or inter-municipal or interstate agencies.

**Funding limitations:** Grants may not exceed 75 percent of the estimated total eligible cost of the project.

**Other limitations:** Proposed projects must have been approved by the appropriate State Water Pollution Control agency or agencies. In addition, the Administrator must determine that such project will serve as a useful demonstration for the purpose as set forth above.

or 2) **Statutory authority:** Section 105 (b).

**Purpose:** To demonstrate in river basins or portions thereof, advanced treatment and environmental enhancement techniques to control pollution from all sources including non-point sources, together with instream water quality improvement techniques.

**Eligible grantees:** States or interstate agencies.

**Funding limitations:** Grants may not exceed 95 percent of the estimated total eligible cost of the project.

**Other limitations:** None

or 3) **Statutory authority:** Section 105 (c).

**Purpose:** To support research and demonstration projects for prevention of pollution of any waters by industry including but not limited to, the prevention, reduction, and elimination of the discharge of pollutants.

**Eligible grantees:** Individuals, corporations, partnerships, associations, States, municipalities, commissions or political subdivisions of a State, or any interstate body.

**Funding limitations:** Grants may not exceed 75 percent of the estimated total eligible cost of the project.

Other **limitations:** The Administrator must determine that the project will develop or demonstrate a new or improved method of treating industrial wastes or otherwise prevent pollution by industry, which method shall have industrywide application.

or 4) **Statutory authority:** Section 105 (d).

**Purpose:** To develop, refine and achieve practical application of: (1) waste management methods applicable to point and non-point sources of pollutants to eliminate the discharge of pollutants, including, but not limited to, elimination of runoff of pollutants and the effects of pollutants from inplace or accumulated sources;

(2) advanced waste treatment methods applicable to point and non-point sources, including inplace or accumulated sources of pollutants, and methods for reclaiming and recycling water and confining pollutants so they will not migrate to cause water or other environmental pollution; and

(3) improved methods and procedures to identify and measure the effects of pollutants on the chemical, physical and biological integrity of water, including those pollutants created by new technological developments.

**Eligible grantees:** Individuals, corporations, partnerships, associations, States, municipalities, commissions, or political subdivisions of a State, or any interstate body.

**Funding limitations:** Grants may not exceed 75 percent of the estimated total eligible cost of the project.

**Other limitations:** None

105 0r 5) **Statutory authority:** Section 105 (e).

**Purpose:** To support research and demonstration projects with respect to new and improved methods of preventing, reducing, storing, collecting, treating, or otherwise eliminating pollution from sewage in rural and other areas where collection of sewage in conventional, community-wide sewage collection systems is impractical, uneconomical, or otherwise infeasible, or where soil conditions or other factors preclude the use of septic tank and drainage field systems.

**Eligible grantees:** Individuals, corporations, partnerships, associations, States, municipalities, commissions, or political subdivisions of a State or any interstate body.

**Funding limitations:** Grants may not exceed 95 percent of the estimated total eligible cost of the project.

**Other limitations:** Grants must be made in consultation with the Secretary of Agriculture or other interested Federal agencies.

107 **Statutory authority:** Section 107, Federal Water Pollution Control Act, as amended, (P.L. 92-500) --- 33 U.S.C. 1257.

**Purpose:** To demonstrate comprehensive approaches to the elimination or control of acid or other mine water pollution resulting from active or abandoned mining operations and other environmental pollution affecting water quality within all or part of a watershed or river basin, including siltation from surface mining.

**Eligible grantees:** Individuals, corporations, partnerships, associations, States, municipalities, commissions, or political subdivisions of a State, or any interstate body.

**Funding limitations:** Grants may not exceed 95 percent of the estimated total eligible cost of the project.

**Other limitations:** In selecting watersheds, the Administrator shall be satisfied that the project area will not be affected adversely by the influx of acid or other mine water pollution from nearby sources. The State shall acquire any land or interests therein necessary for such project and the State shall provide legal and practical protection to the project area to insure against any activities which will cause future acid or other mine water pollution. In addition, for any demonstration project in the Appalachian region (as defined in Section 403 of the Appalachian Regional Development Act of 1965, as amended) the Appalachian Regional Commission shall determine that such demonstration project is consistent with the objectives of the Appalachian Regional Development Act of 1965, as amended.

113 **Statutory authority:** Section 113, Federal Water Pollution Control Act, as amended (P.L. 92–500) --- 33 U.S.C. 1263.

**Purpose:** To demonstrate methods to provide for central community facilities for safe water and elimination or control of water pollution in those native villages of Alaska without such facilities.

**Eligible grantees:** The State of Alaska.

**Funding limitations:** Grants may not exceed 95 percent of the estimated total eligible cost of the project.

**Other limitations:** Projects shall include provisions for community safe water supply system, toilets, bathing and laundry facilities, sewage disposal facilities, and other similar facilities, and educational and informational facilities and programs relating to health and hygiene. Such demonstration projects shall be for the further purpose of developing preliminary plans for providing such safe water and such elimination or control of pollution for all native villages in Alaska.

204 **Statutory authority:** Section 204, Solid Waste Disposal Act, as amended (P.L. 89–272) --- 42 U.S.C. 3253.

**Purpose:** To support and promote the coordination of research, development and demonstration projects relating to any adverse health and welfare effects of the release into the environment of material present in solid waste and methods to eliminate such effects, the operation and financing of solid waste disposal programs, the reduction of the amount of such waste and unsalvageable waste materials, the development and application of new and improved methods of collecting and disposing of solid waste and processing and recovering materials and energy from solid waste, and the identification of solid waste components and potential materials and energy recoverable from waste components.

**Eligible grantees:** Public or private agencies and institutions and individuals.

**Funding limitations:** Grants may not exceed 95 percent of the estimated total eligible cost of the project.

**Other limitations:** All information, uses, processes, patents and other developments resulting from these projects will be made readily available on fair and equitable terms to industries utilizing methods of solid waste disposal and industries engaging in furnishing devices, facilities, equipment and supplies to be used in connection with solid waste disposal.

301 **Statutory authority:** Section 301, Public Health Service Act, as amended (P.L. 78–410) --- 42 U.S.C. 241.

**Purpose:** To support and promote the coordination of research projects for the determination of the extent and character of radiation problems, mechanisms of radiation damage in humans, improvements in techniques for assessing the effects of radiation and radiation dose-disease relationship.

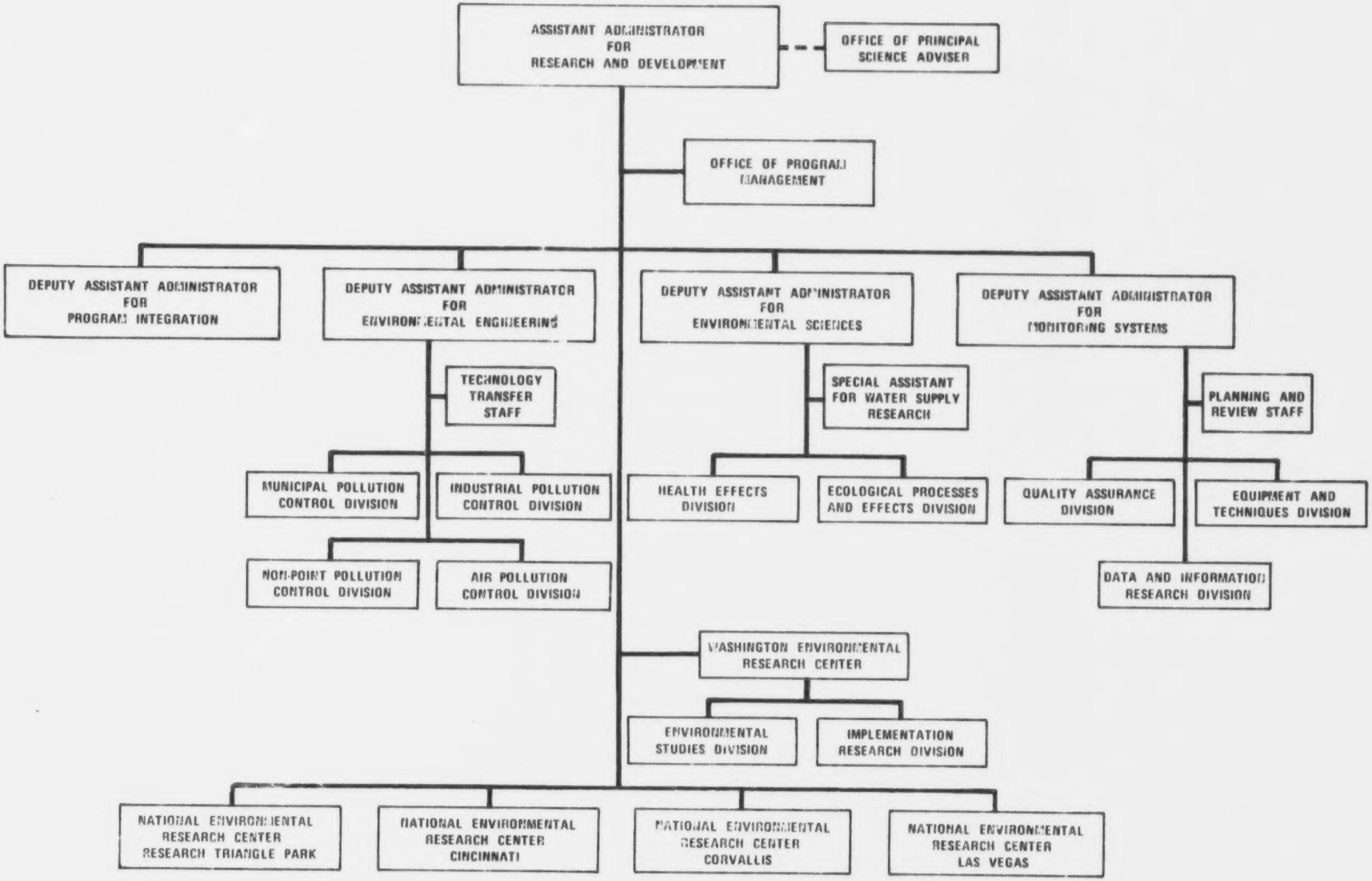
**Eligible grantees:** Universities, hospitals, laboratories and other public or private institutions or individuals.

**Funding limitations:** Grants may not exceed 95 percent of the estimated total eligible cost of the project.

**Other limitations:** All grants must be recommended by the National Advisory Health Council.

Mixed Statutory authority and other requirements can be any of the listed laws or the Grants Act, 42 U.S.C. 1891, depending upon the specific purpose of the project.

APPENDIX "B" FIGURE 1


ASSISTANT ADMINISTRATOR FOR RESEARCH AND DEVELOPMENT
OFFICE OF PRINCIPAL SCIENCE ADVISER
OFFICE OF PROGRAM MANAGEMENT
DEPUTY ASSISTANT ADMINISTRATOR FOR PROGRAM INTEGRATION
DEPUTY ASSISTANT ADMINISTRATOR FOR ENVIRONMENTAL ENGINEERING
TECHNOLOGY TRANSFER STAFF
MUNICIPAL POLLUTION CONTROL DIVISION
INDUSTRIAL POLLUTION CONTROL DIVISION
NON-POINT POLLUTION CONTROL DIVISION
AIR POLLUTION CONTROL DIVISION
DEPUTY ASSISTANT ADMINISTRATOR FOR ENVIRONMENTAL SCIENCES
SPECIAL ASSISTANT FOR WATER SUPPLY RESEARCH
HEALTH EFFECTS DIVISION
ECOLOGICAL PROCESSES AND EFFECTS DIVISION
DEPUTY ASSISTANT ADMINISTRATOR FOR MONITORING SYSTEMS
PLANNING AND REVIEW STAFF
QUALITY ASSURANCE DIVISION
EQUIPMENT AND TECHNIQUES DIVISION
DATA AND INFORMATION RESEARCH DIVISION
WASHINGTON ENVIRONMENTAL RESEARCH CENTER
ENVIRONMENTAL STUDIES DIVISION
IMPLEMENTATION RESEARCH DIVISION
NATIONAL ENVIRONMENTAL RESEARCH CENTER RESEARCH TRIANGLE PARK
NATIONAL ENVIRONMENTAL RESEARCH CENTER CINCINNATI
NATIONAL ENVIRONMENTAL RESEARCH CENTER CORVALLIS
NATIONAL ENVIRONMENTAL RESEARCH CENTER LAS VEGAS

APPENDIX B

Figure 2

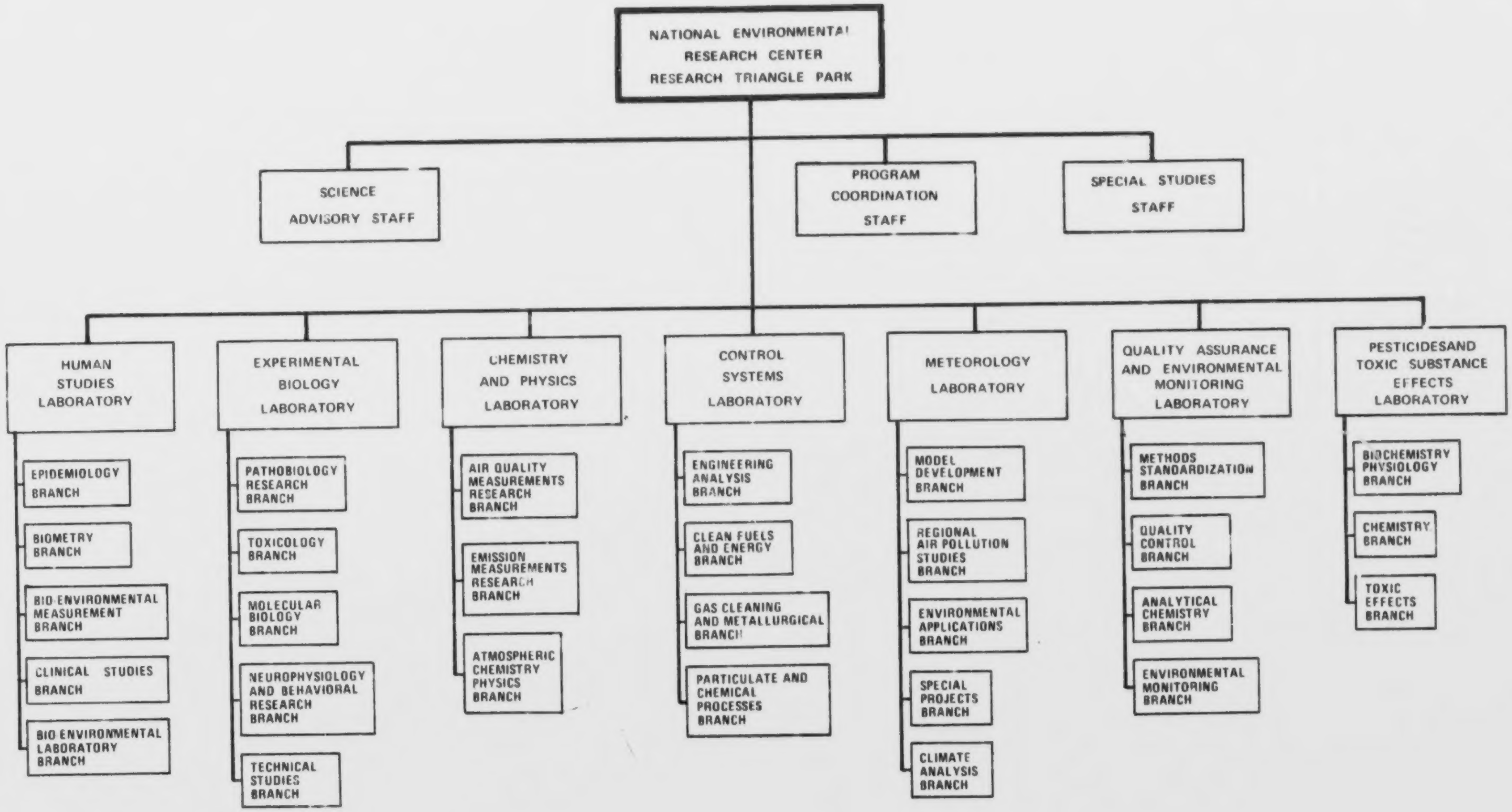

NATIONAL ENVIRONMENTAL RESEARCH CENTER RESEARCH TRIANGLE PARK
SCIENCE ADVISORY STAFF
PROGRAM COORDINATION STAFF
SPECIAL STUDIES STAFF
HUMAN STUDIES LABORATORY
EPIDEMIOLOGY BRANCH
BIOMETRY BRANCH
BIO-ENVIRONMENTAL MEASUREMENT BRANCH
CLINICAL STUDIES BRANCH
BIO-ENVIRONMENTAL LABORATORY BRANCH
EXPERIMENTAL BIOLOGY LABORATORY
PATHOBIOLOGY RESEARCH BRANCH
TOXICOLOGY BRANCH
MOLECULAR BIOLOGY BRANCH
NEUROPHYSIOLOGY AND BEHAVIORAL RESEARCH BRANCH
TECHNICAL STUDIES BRANCH
CHEMISTRY AND PHYSICS LABORATORY
AIR QUALITY MEASUREMENTS RESEARCH BRANCH
EMISSION MEASUREMENTS RESEARCH BRANCH
ATMOSPHERIC CHEMISTRY PHYSICS BRANCH
CONTROL SYSTEMS LABORATORY
ENGINEERING ANALYSIS BRANCH
CLEAN FUELS AND ENERGY BRANCH
GAS CLEANING AND METALLURGICAL BRANCH
PARTICULATE AND CHEMICAL PROCESSES BRANCH
METEOROLOGY LABORATORY
MODEL DEVELOPMENT BRANCH
REGIONAL AIR POLLUTION STUDIES BRANCH
ENVIRONMENTAL APPLICATIONS BRANCH
SPECIAL PROJECTS BRANCH
CLIMATE ANALYSIS BRANCH
QUALITY ASSURANCE AND ENVIRONMENTAL MONITORING LABORATORY
METHODS STANDARDIZATION BRANCH
QUALITY CONTROL BRANCH
ANALYTICAL CHEMISTRY BRANCH
ENVIRONMENTAL MONITORING BRANCH
PESTICIDESAND TOXIC SUBSTANCE EFFECTS LABORATORY
BIOCHEMISTRY PHYSIOLOGY BRANCH
CHEMISTRY BRANCH
TOXIC EFFECTS BRANCH

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Figure 3

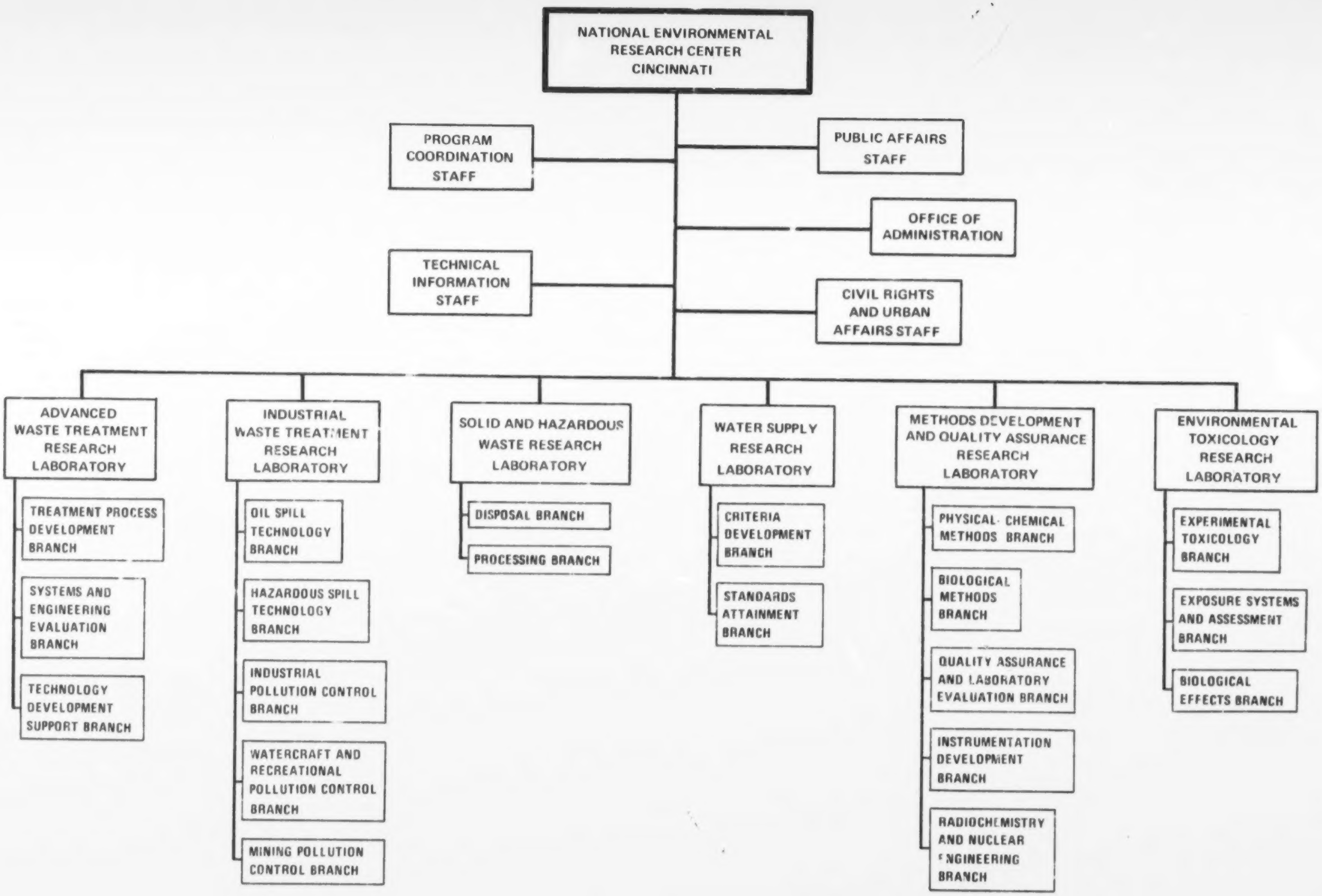
NATIONAL ENVIRONMENTAL RESEARCH CENTER CINCINNATI
PROGRAM COORDINATION STAFF
PUBLIC AFFAIRS STAFF
OFFICE OF ADMINISTRATION
TECHNICAL INFORMATION STAFF
CIVIL RIGHTS AND URBAN AFFAIRS STAFF
ADVANCED WASTE TREATMENT RESEARCH LABORATORY
TREATMENT PROCESS DEVELOPMENT BRANCH
SYSTEMS AND ENGINEERING EVALUATION BRANCH
TECHNOLOGY DEVELOPMENT SUPPORT BRANCH
INDUSTRIAL WASTE TREATMENT RESEARCH LABORATORY
OIL SPILL TECHNOLOGY BRANCH
HAZARDOUS SPILL TECHNOLOGY BRANCH
INDUSTRIAL POLLUTION CONTROL BRANCH
WATERCRAFT AND RECREATIONAL POLLUTION CONTROL BRANCH
MINING POLLUTION CONTROL BRANCH
SOLID AND HAZARDOUS WASTE RESEARCH LABORATORY
DISPOSAL BRANCH
PROCESSING BRANCH
WATER SUPPLY RESEARCH LABORATORY
CRITERIA DEVELOPMENT BRANCH
STANDARDS ATTAINMENT BRANCH
METHODS DEVELOPMENT AND QUALITY ASSURANCE RESEARCH LABORATORY
PHYSICAL- CHEMICAL METHODS BRANCH
BIOLOGICAL METHODS BRANCH
QUALITY ASSURANCE AND LABORATORY EVALUATION BRANCH
INSTRUMENTATION DEVELOPMENT BRANCH
RADIOCHEMISTRY AND NUCLEAR ENGINEERING BRANCH
ENVIRONMENTAL TOXICOLOGY RESEARCH LABORATORY
EXPERIMENTAL TOXICOLOGY BRANCH
EXPOSURE SYSTEMS AND ASSESSMENT BRANCH
BIOLOGICAL EFFECTS BRANCH

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Figure 4

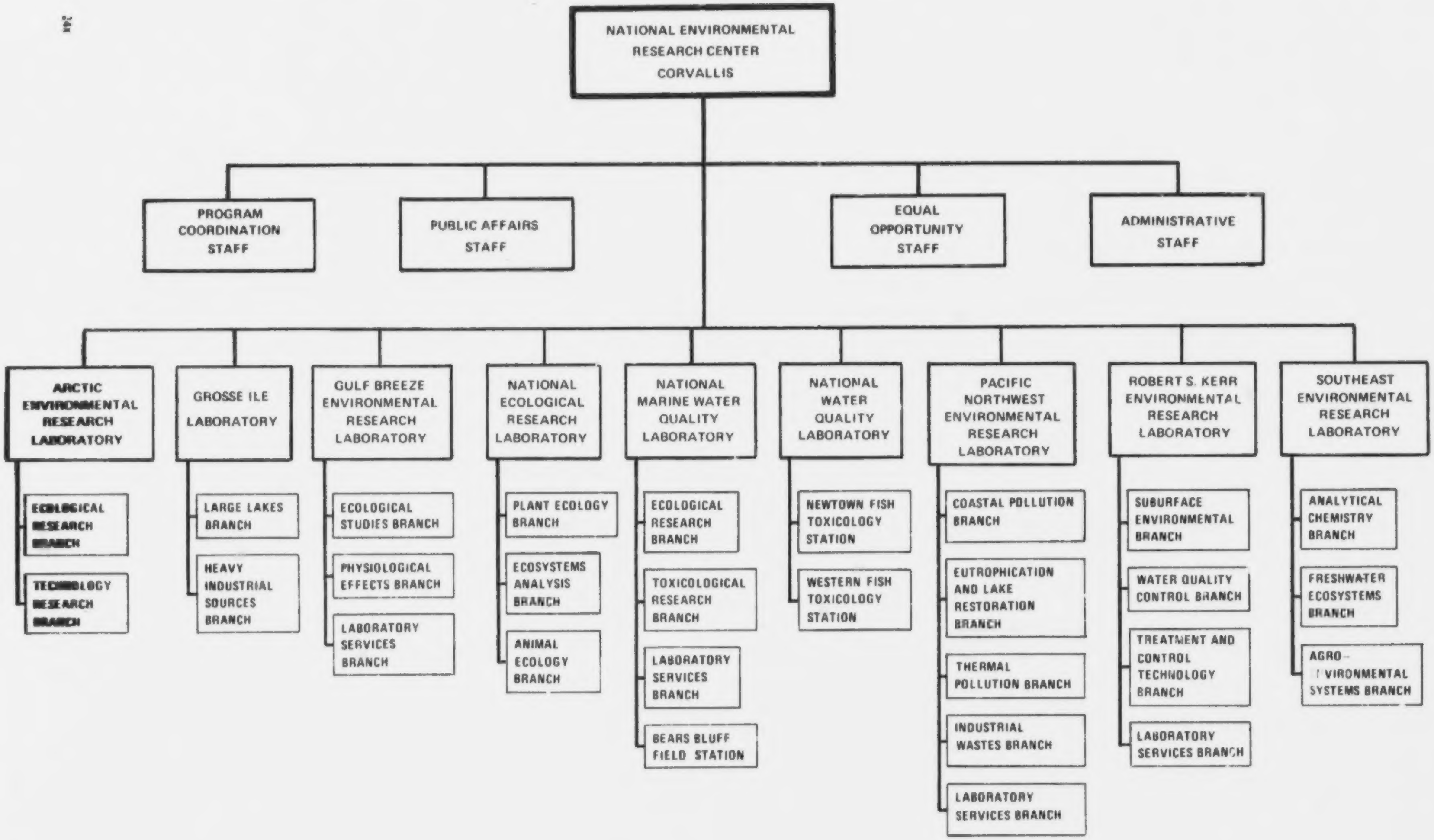
NATIONAL ENVIRONMENTAL RESEARCH CENTER CORVALLIS
PROGRAM COORDINATION STAFF
PUBLIC AFFAIRS STAFF
EQUAL OPPORTUNITY STAFF
ADMINISTRATIVE STAFF
ARCTIC ENVIRONMENTAL RESEARCH LABORATORY
ECOLOGICAL RESEARCH BRANCH
TECHNOLOGY RESEARCH BRANCH
GROSSE ILE LABORATORY
LARGE LAKES BRANCH
HEAVY INDUSTRIAL SOURCES BRANCH
GULF BREEZE ENVIRONMENTAL RESEARCH LABORATORY
ECOLOGICAL STUDIES BRANCH
PHYSIOLOGICAL EFFECTS BRANCH
LABORATORY SERVICES BRANCH
NATIONAL ECOLOGICAL RESEARCH LABORATORY
PLANT ECOLOGY BRANCH
ECOSYSTEMS ANALYSIS BRANCH
ANIMAL ECOLOGY BRANCH
NATIONAL MARINE WATER QUALITY LABORATORY
ECOLOGICAL RESEARCH BRANCH
TOXICOLOGICAL RESEARCH BRANCH
LABORATORY SERVICES BRANCH
BEARS BLUFF FIELD STATION
NATIONAL WATER QUALITY LABORATORY
NEWTOWN FISH TOXICOLOGY STATION
WESTERN FISH TOXICOLOGY STATION
PACIFIC NORTHWEST ENVIRONMENTAL RESEARCH LABORATORY
COASTAL POLLUTION BRANCH
EUTROPHICATION AND LAKE RESTORATION BRANCH
THERMAL POLLUTION BRANCH
INDUSTRIAL WASTES BRANCH
LABORATORY SERVICES BRANCH
ROBERT S. KERR ENVIRONMENTAL RESEARCH LABORATORY
SUBURFACE ENVIRONMENTAL BRANCH
WATER QUALITY CONTROL BRANCH
TREATMENT AND CONTROL TECHNOLOGY BRANCH
LABORATORY SERVICES BRANCH
SOUTHEAST ENVIRONMENTAL RESEARCH LABORATORY
ANALYTICAL CHEMISTRY BRANCH
FRESHWATER ECOSYSTEMS BRANCH
AGRO-ENVIRONMENTAL SYSTEMS BRANCH

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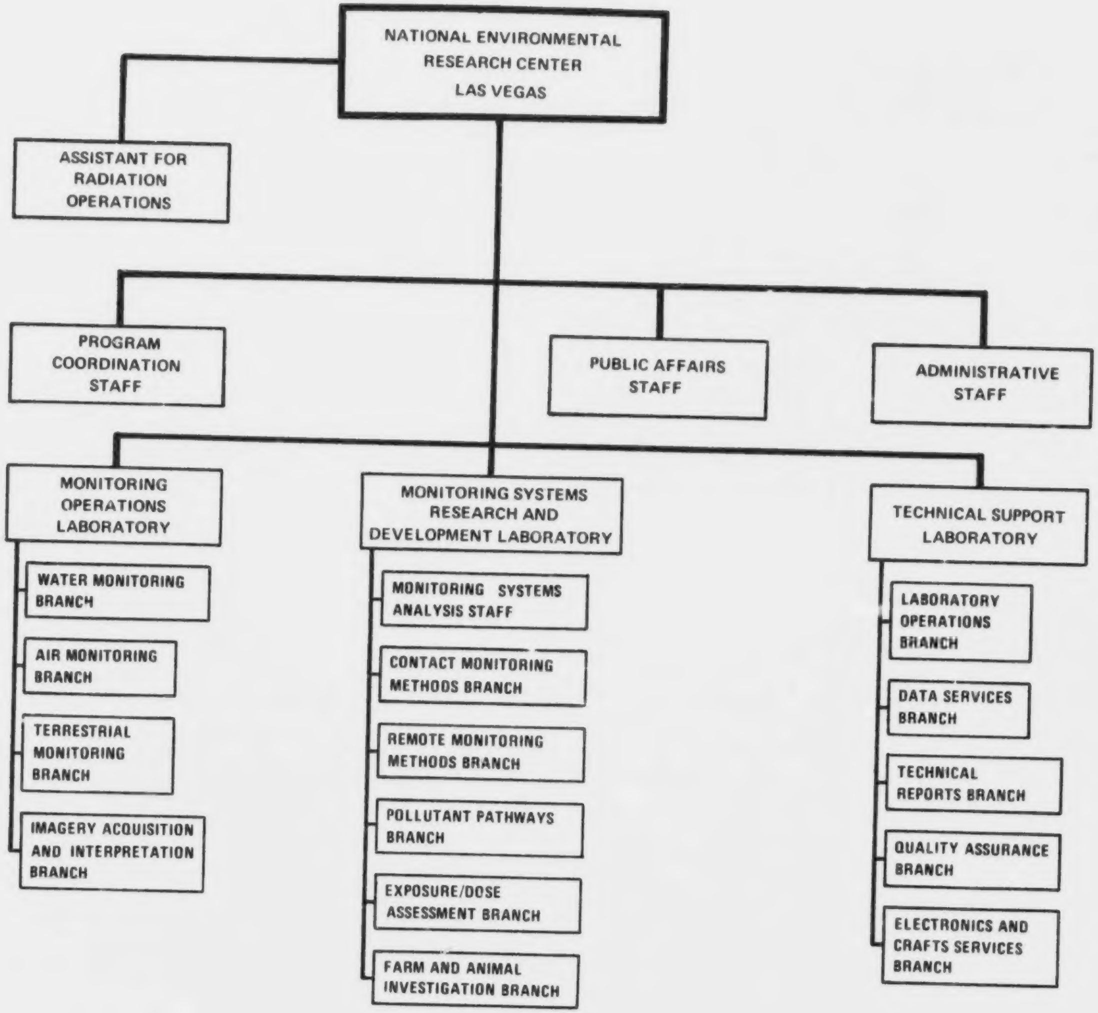
Figure 5


NATIONAL ENVIRONMENTAL RESEARCH CENTER LAS VEGAS
ASSISTANT FOR RADIATION OPERATIONS
PROGRAM COORDINATION STAFF
PUBLIC AFFAIRS STAFF
ADMINISTRATIVE STAFF
MONITORING OPERATIONS LABORATORY
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AIR MONITORING BRANCH
TERRESTRIAL MONITORING BRANCH
IMAGERY ACQUISITION AND INTERPRETATION BRANCH
MONITORING SYSTEMS RESEARCH AND DEVELOPMENT LABORATORY
MONITORING SYSTEMS ANALYSIS STAFF
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REMOTE MONITORING METHODS BRANCH
POLLUTANT PATHWAYS BRANCH
EXPOSURE/DOSE ASSESSMENT BRANCH
FARM AND ANIMAL INVESTIGATION BRANCH
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LABORATORY OPERATIONS BRANCH
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QUALITY ASSURANCE BRANCH
ELECTRONICS AND CRAFTS SERVICES BRANCH

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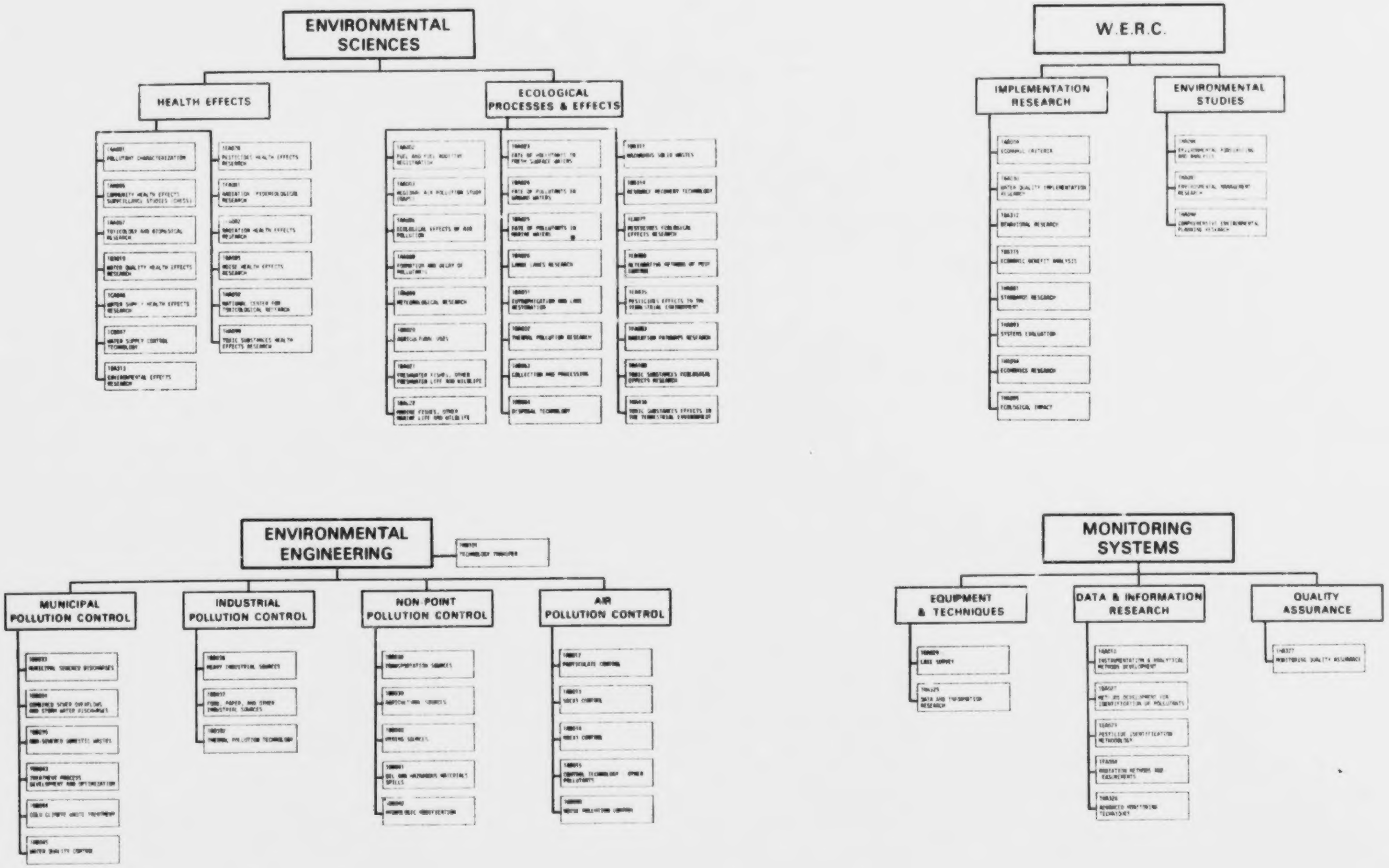
FISCAL YEAR 1974


ENVIRONMENTAL SCIENCES
HEALTH EFFECTS
POLLUTANT CHARACTERIZATION
COMMUNITY HEALTH EFFECTS SURVEILLANCE STUDIES (CHESS)
TOXICOLOGY AND BIOMEDICAL RESEARCH
WATER QUALITY HEALTH EFFECTS RESEARCH
WATER SUPPLY HEALTH EFFECTS RESEARCH
WATER SUPPLY CONTROL TECHNOLOGY
ENVIRONMENTAL EFFECTS RESEARCH
PESTICIDES HEALTH EFFECTS RESEARCH
RADIATION EPIDEMIOLOGICAL RESEARCH
RADIATION HEALTH EFFECTS RESEARCH
NOISE HEALTH EFFECTS RESEARCH
NATIONAL CENTER FOR TOXICOLOGICAL RESEARCH
TOXIC SUBSTANCES HEALTH EFFECTS RESEARCH
ECOLOGICAL PROCESSES & EFFECTS
FUEL AND FUEL ADDITIVE REGISTRATION
REGIONAL AIR POLLUTION STUDY (RAPS)
ECOLOGICAL EFFECTS OF AIR POLLUTION
FORMATION AND DECAY OF POLLUTANTS
METEOROLOGICAL RESEARCH
AGRICULTURAL USES
FRESHWATER FISHES, OTHER FRESHWATER LIFE AND WILDLIFE
MARINE FISHES, OTHER MARINE LIFE AND WILDLIFE
FATE OF POLLUTANTS IN FRESH SURFACE WATERS
FATE OF POLLUTANTS IN GROUND WATERS
FATE OF POLLUTANTS IN MARINE WATERS
LARGE LAKES RESEARCH
EUTROPHICATION AND LAKE RESTORATION
THERMAL POLLUTION RESEARCH
COLLECTION AND PROCESSING
DISPOSAL TECHNOLOGY
HAZARDOUS SOLID WASTES
RESOURCE RECOVERY TECHNOLOGY
PESTICIDES ECOLOGICAL EFFECTS RESEARCH
ALTERNATIVE METHODS OF PEST CONTROL
PESTICIDES EFFECTS IN THE TERRESTRIAL ENVIRONMENT
RADIATION PATHWAYS RESEARCH
TOXIC SUBSTANCES ECOLOGICAL EFFECTS RESEARCH
TOXIC SUBSTANCES EFFECTS IN THE TERRESTRIAL ENVIRONMENT
W.E.R.C.
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BEHAVIORAL RESEARCH
ECONOMIC BENEFIT ANALYSIS
STANDARDS RESEARCH
SYSTEMS EVALUATION
ECONOMICS RESEARCH
ECOLOGICAL IMPACT
ENVIRONMENTAL STUDIES
ENVIRONMENTAL FORECASTING AND ANALYSIS
ENVIRONMENTAL MANAGEMENT RESEARCH
COMPREHENSIVE ENVIRONMENTAL PLANNING RESEARCH
ENVIRONMENTAL ENGINEERING
TECHNOLOGY TRANSFER
MUNICIPAL POLLUTION CONTROL
MUNICIPAL SEWERED DISCHARGES
COMBINED SEWER OVERFLOWS AND STORM WATER DISCHARGES
NON-SEWERED DOMESTIC WASTES
TREATMENT PROCESS DEVELOPMENT AND OPTIMIZATION
COLD CLIMATE WASTE TREATMENT
WATER QUALITY CONTROL
INDUSTRIAL POLLUTION CONTROL
HEAVY INDUSTRIAL SOURCES
FOOD, PAPER, AND OTHER INDUSTRIAL SOURCES
THERMAL POLLUTION TECHNOLOGY
NON POINT POLLUTION CONTROL
TRANSPORTATION SOURCES
AGRICULTURAL SOURCES
MINING SOURCES
OIL AND HAZARDOUS MATERIALS SPILLS
HYDROLOGIC MODIFICATION
AIR POLLUTION CONTROL
PARTICULATE CONTROL
SOX CONTROL
NOX CONTROL
CONTROL TECHNOLOGY - OTHER POLLUTANTS
NOISE POLLUTION CONTROL
MONITORING SYSTEMS
EQUIPMENT & TECHNIQUES
LAKE SURVEY
DATA AND INFORMATION RESEARCH
DATA & INFORMATION RESEARCH
INSTRUMENTATION & ANALYTICAL METHODS DEVELOPMENT
METHODS DEVELOPMENT FOR IDENTIFICATION OF POLLUTANTS
PESTICIDE IDENTIFICATION METHODOLOGY
RADIATION METHODS AND MEASUREMENTS
ADVANCED MONITORING TECHNIQUES
QUALITY ASSURANCE
MONITORING QUALITY ASSURANCE

# OFFICE OF RESEARCH AND DEVELOPMENT

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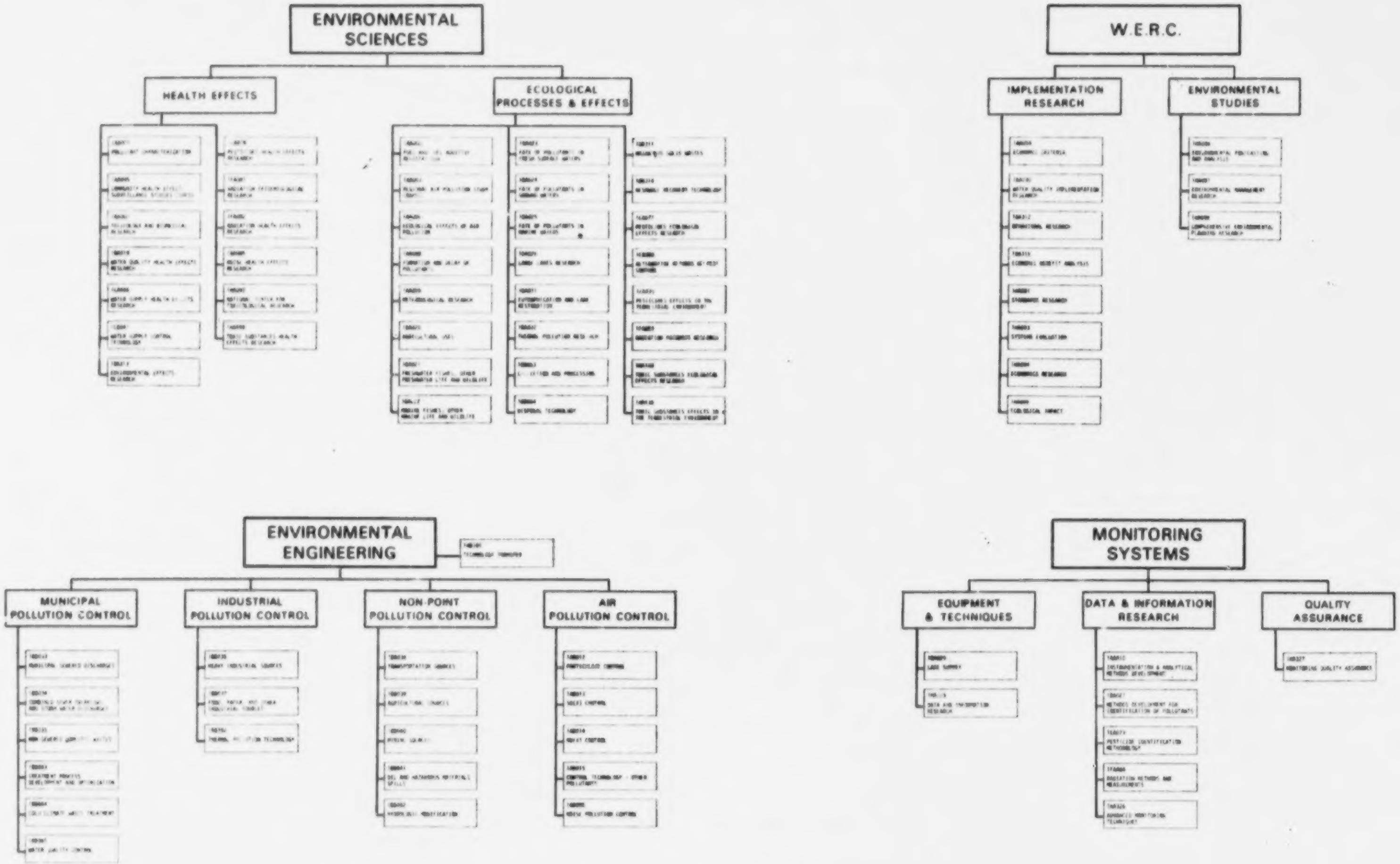
ENVIRONMENTAL SCIENCES
HEALTH EFFECTS
ECOLOGICAL PROCESSES & EFFECTS
W.E.R.C.
IMPLEMENTATION RESEARCH
ENVIRONMENTAL STUDIES
ENVIRONMENTAL ENGINEERING
MUNICIPAL POLLUTION CONTROL
INDUSTRIAL POLLUTION CONTROL
NON-POINT POLLUTION CONTROL
AIR POLLUTION CONTROL
MONITORING SYSTEMS
EQUIPMENT & TECHNIQUES
DATA & INFORMATION RESEARCH
QUALITY ASSURANCE

# APPENDIX C

## REGIONAL RESEARCH AND DEVELOPMENT REPRESENTATIVES

| ORGANIZATION | NAME | ADDRESS | TELEPHONE |
|---|---|---|---|
| Region I<br>Connecticut<br>Maine<br>Massachusetts<br>New Hampshire<br>Rhode Island<br>Vermont | Dr. Helen McCammon | John F. Kennedy Building<br>Room 2303<br>Boston, Massachusetts 02203 | (617) 223–3477 |
| Region II<br>Delaware<br>New Jersey<br>New York<br>Puerto Rico | Dr. Robert W. Mason | 26 Federal Plaza<br>Room 845-C<br>New York, New York 10007 | (212) 264–3100 |
| Region III<br>District of Columbia<br>Maryland<br>Pennsylvania<br>West Virginia<br>Virginia | Mr. Albert Montague | Curtis Building<br>6th and Walnut Streets<br>Philadelphia, Pennsylvania 19106 | (215) 597–9856 |
| Region IV<br>Alabama<br>Florida<br>Georgia<br>Kentucky<br>Mississippi<br>North Carolina<br>South Carolina<br>Tennessee | Mr. Edmond Lomasney | 1421 Peachtree Street, N.E.<br>Suite 300<br>Atlanta, Georgia 30309 | (404) 526–3229 |

| | | | |
|---|---|---|---|
| Region V<br>Illinois<br>Indiana<br>Michigan<br>Minnesota<br>Ohio<br>Wisconsin | Mr. Clifford Risley, Jr | One North Wacker Drive<br>Chicago, Illinois 60606 | (312) 353-5756 |
| Region VI<br>Arkansas<br>Louisiana<br>New Mexico<br>Oklahoma<br>Texas | Ms. Mildred Smith | 1600 Patterson<br>Suite 1100<br>Dallas, Texas 75201 | (214) 749-1461 |
| Region VII<br>Iowa<br>Kansas<br>Missouri<br>Nebraska | Mr. William Garner | TWA Building<br>1735 Baltimore<br>Room 249<br>Kansas City, Missouri 64108 | (816) 374-5736 |
| Region VIII<br>Colorado<br>Montana<br>North Dakota<br>South Dakota<br>Utah<br>Wyoming | Mr. Russell W. Fitch | 1860 Lincoln Street<br>Suite 900<br>Denver, Colorado 80203 | (303) 837-3849 |
| Region IX<br>Arizona<br>California<br>Hawaii<br>Nevada | Mr. Vern Tenney | 100 California Street<br>San Francisco, California 94111 | (415) 556-6506 |
| Region X<br>Alaska<br>Idaho<br>Oregon<br>Washington | Mr. Robert Courson | 1200 6th Avenue<br>Seattle, Washington 98101 | (206) 442-1296 |

# INSTRUCTIONS FOR USING SUBJECT MATTER INDEX GUIDE TO OR&D PROGRAMS

This index is derived from two sources: (a) FY '74 program element titles, amended to make them explicit and self-contained, are listed alphabetically by several key phrases/words. This procedure produces a list of entries where each subject refers to a single program element number, (b) an analysis of OR&D activities made from the viewpoint of user interest categories was used to produce an outline for grouping the first set of entries under broad subject categories. The outline used is shown below:

I. Assessment/Analysis
    A. Socio-economic
    B. Systems Evaluation
    C. Technological

II. Effects
    A. Animals
    B. Humans
    C. Materials
    D. Plants

III. Measurements
    A. Characterization
    B. Detection
    C. Sampling and Assay

IV. Receptors
    A. Animals
    B. Materials
    C. Plants

V. Sources
    A. Mobile
    B. Stationary, Distributed
    C. Stationary, Point

VI. Techniques for Control
    A. Economic, Societal
    B. Public Needs
    C. Source Control Processes

VIII. Transport of Pollutants
    A. Air
    B. Refuse
    C. Water

The entries derived from the program element titles were inserted into this outline and alphabetized under each sub-group. Entries which seemed to apply broadly across a group (i.e. – Effects) were alphabetized under thee major heading rather than the sub-heading.

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| Agricultural Solid Wastes | 1DB063 | 80 |
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| Hazardous Solid Wastes | 1DB311 | 86 |
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